



# IESNA LM79-2008 Test Report

TÜV SÜD America

## Photometric Testing and Evaluation in Accordance with LM79-2008

Report Prepared for:

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**Sample Tested:** ELLF135UM50  
**Sample Description:** LED Architectural Flood/Spot Luminaire  
**Manufacturer:** Maxlite, Inc.

**Technical Report Number:** JI1300936-01-LM79  
**Report Issue Date:** February 4<sup>th</sup> 2013  
**Total Number of Pages:** 11 (including this page)

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**Bryan Cubitt**  
TÜV SÜD Program Manager



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## Summary of Key Test Results

Model# **ELLF135UM50**  
 Manufacturer **Maxlite, Inc.**  
 TÜV Sample# **581-1**  
 Date of Test **February 1<sup>st</sup> 2013**



Notes: Tested in intended orientation (Horizontal)

<b>Parameter</b>	<b>Measured Result</b>
Luminous Flux	<b>12,130 Lumens</b>
Input Power	<b>137.79 Watts</b>
Efficacy	<b>88.03 Lumens/Watt</b>
C.C.T.	<b>5114 K</b>
C.R.I. (R <sub>a</sub> )	<b>76.1</b>
Beam Angle	<b>55.6°</b>
Stabilization Time	<b>75 minutes</b>
In-Situ Temp Test (ISTMT)**	<b>68.5°C (LED)</b>

The above results are recorded / derived from measurements in accordance with LM79-08  
 \*\*ISTMT in accordance with “Energy Star Program Requirements for Luminaires – Version 1.1”.



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**Test Results –**

The following results were obtained after stabilization of the sample in accordance with the requirements set forth in section 5.0 of IES LM79-2008. Stability is achieved when the variation of 3 readings of light output and electrical power over a period of 30 minutes, taken 15 minutes apart, is less than 0.5%.

Photometric Results	Maxlite- ELLF135UM50	
	Integrating Sphere	Goniophotometer
Total Luminous Flux (Lumens)	12,130.0	11,975.4
Luminous Efficacy (Lumens/Watt)	88.03	87.03
Total Radiant Flux (Watts)	38.4	-
Correlated Color Temperature (CCT)	5114	-
Color Rendering Index (CRI – R <sub>a</sub> )	76.1	-
R <sub>9</sub> Value	-1.5	-
Chromaticity (Chroma x / Chroma y)	0.3415 / 0.3438	-
Chromaticity (Chroma u / Chroma v)	0.2120 / 0.3202	-
Chromaticity (Chroma u' / Chroma v')	0.2120 / 0.4803	-
D <sub>uv</sub> Value	-0.00247	-

Electrical Results (120V unless stated otherwise)	Maxlite- ELLF135UM50	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	137.79	137.60
Input Voltage (Volts AC)	120.0	120.0
Input Current (Amps)	1.150	1.150
Power Factor @120VAC	0.994	0.997
Power Factor @277VAC	0.928	N/A
Input Frequency (Hertz)	60.0	60.0
A-THD @120VAC (Current %)	7.18 %	7.72 %
A-THD @277VAC (Current %)	12.90 %	N/A

Additional Parameters	Maxlite- ELLF135UM50	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	75 minutes	70 minutes
Test Geometry Configuration	4π	Type C
Ambient Temperature	25.2°C	25.3°C
ISTMT (In-Situ Temperature Measurement)	68.5°C (LED)	
Spacing Criteria	0.84 (0° – 180°) / 0.92 (90° – 270°)	





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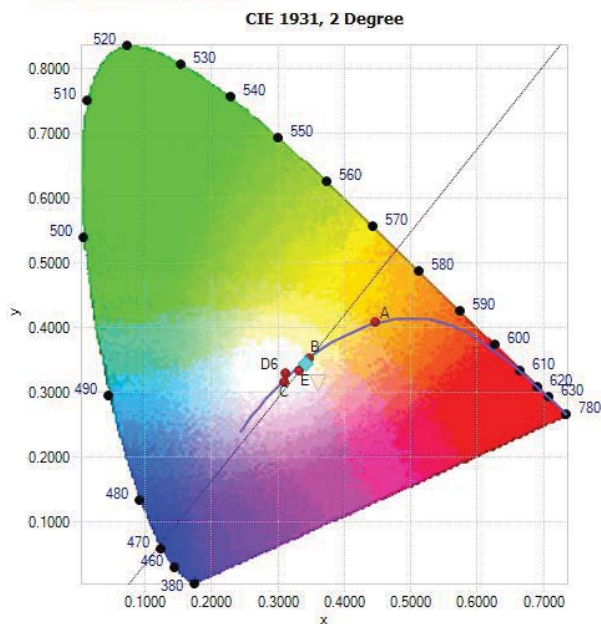
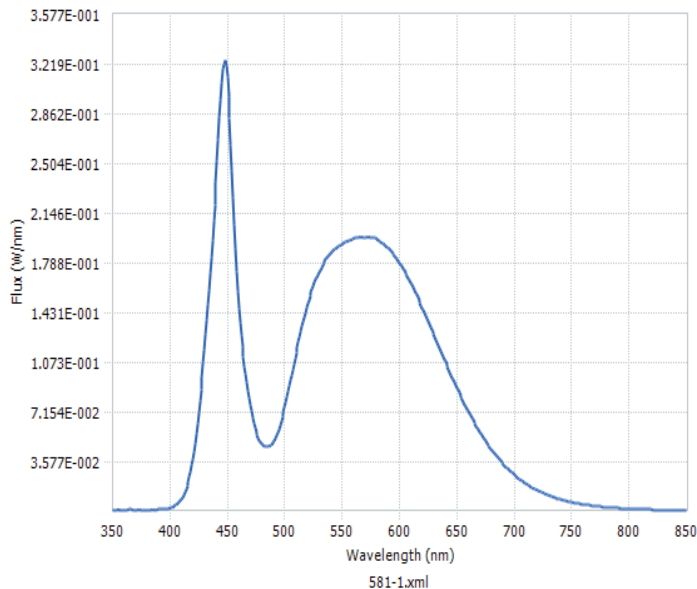
## Spectral Flux and Chromaticity Diagram

### Spectral Flux

### Chromaticity Diagram

▼ SPECTRAL FLUX GRAPH:

▼ CHROMATICITY DIAGRAM:



Spectral response of the Radiant Flux

Tristimulus values (from page 5):

(350nm to 850nm)

$x / y = 0.3415 / 0.3438$

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

### Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	11,794.9	98.5 %
60 - 90	180.6	1.5 %
0 - 90	11,975.4	100 %
90 - 180	0.0	0 %
0 - 180	11,975.4	100 %

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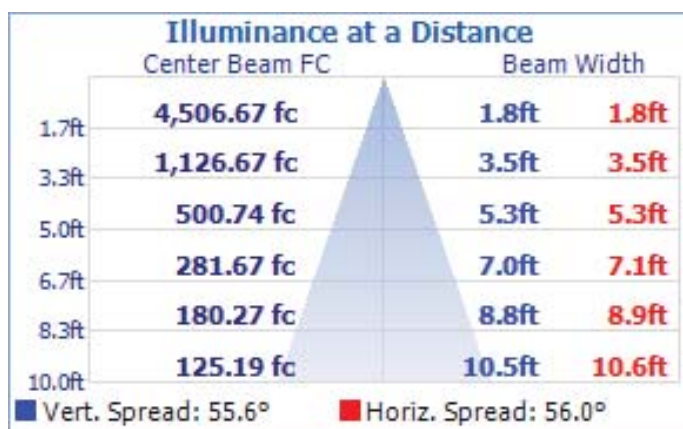


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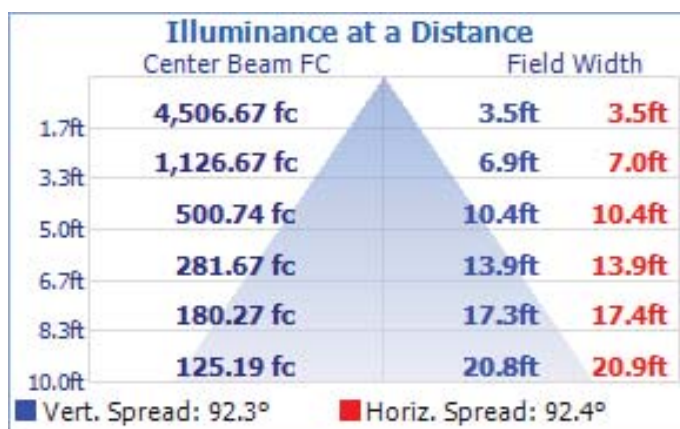
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## Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.



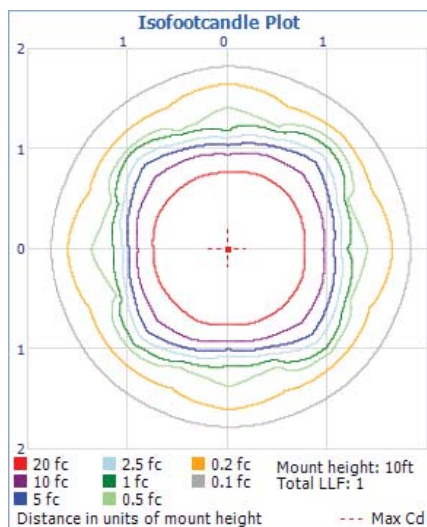
Beam Angle = 55.6°



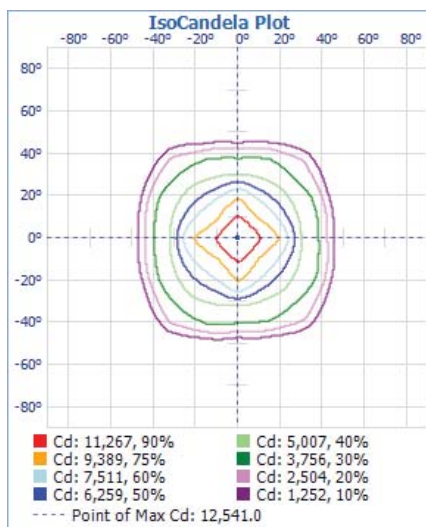
Field Angle = 92.3°

## Test Results – Candela Plots

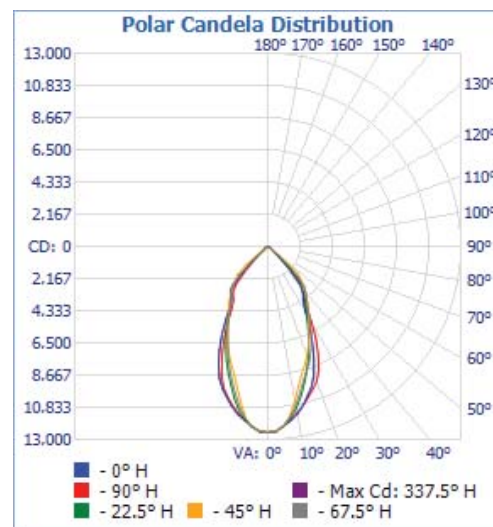
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela



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## Test Results – Candela Tabulation

The table below displays the tabulated Candela measurements from the IES file:

Horizontal (lateral) angles are shown in **red** across the top of the table, in increments of 22.5°.

Vertical (longitudinal) angles are shown in **blue** down the side of the table, in increments of 2.5°.

	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	12519	12519	12519	12519	12519	12519	12519	12519	12519	12519	12519	12519	12519	12519	12519	12519	12519
2.5	12468	12452	12451	12440	12446	12427	12432	12516	12472	12442	12462	12471	12504	12514	12528	12541	12466
5.0	12151	12111	12124	12135	12099	12106	12153	12247	12191	12194	12241	12193	12184	12233	12289	12285	12149
7.5	11814	11659	11446	11561	11701	11667	11550	11741	11827	11781	11598	11674	11778	11731	11556	11780	11814
10.0	11438	11049	10492	10828	11360	11107	10610	11046	11509	11215	10627	10977	11416	11053	10521	10964	11438
12.5	10954	10296	9569	10024	10950	10374	9659	10180	11088	10452	9648	10146	10968	10258	9576	10061	10952
15.0	10378	9499	8854	9305	10503	9631	8868	9333	10583	9630	8860	9335	10473	9485	8843	9231	10377
17.5	9836	8726	8308	8704	10067	9002	8314	8644	10087	8891	8280	8592	9946	8691	8214	8538	9834
20.0	9085	7933	7762	8172	9629	8429	7829	8012	9505	8160	7675	7833	9135	7833	7519	7762	9084
22.5	8086	7132	7143	7552	8942	7773	7305	7348	8690	7381	7021	7107	8095	7038	6823	6990	8078
25.0	7045	6429	6519	6901	8006	7122	6750	6718	7727	6647	6403	6430	7041	6346	6190	6278	7042
27.5	6062	5790	5977	6262	6980	6494	6247	6141	6734	5979	5833	5805	5987	5656	5638	5636	6058
30.0	5075	5200	5503	5638	5867	5834	5782	5580	5648	5326	5344	5208	4928	4977	5157	5086	5072
32.5	4410	4666	5062	5054	4843	5155	5366	5058	4727	4747	4934	4677	4322	4440	4728	4602	4408
35.0	4128	4294	4656	4593	4286	4603	4960	4671	4323	4343	4556	4330	4100	4142	4291	4291	4127
37.5	3848	4056	4238	4244	3998	4237	4554	4395	4072	4136	4148	4112	3864	3937	3864	4077	3848
40.0	3360	3791	3809	3950	3729	3958	4111	4142	3765	3941	3715	3881	3349	3700	3463	3822	3360
42.5	2386	3178	3454	3620	3072	3626	3676	3817	3065	3556	3330	3412	2330	2984	3146	3307	2386
45.0	1372	2142	3136	2909	2122	2814	3310	3095	2066	2695	3062	2379	1317	1922	2871	2297	1371
47.5	527	1101	2762	1925	1143	1853	3031	2069	1010	1641	2763	1328	414	902	2352	1265	526
50.0	292	320	1874	982	375	846	2427	1010	359	603	1852	375	281	201	1368	424	292
52.5	272	154	897	241	282	198	1390	255	301	171	854	145	268	146	552	148	271
55.0	217	136	305	137	244	145	536	142	265	143	226	128	225	130	186	128	216
57.5	142	112	124	116	175	123	152	121	192	122	126	108	152	108	112	105	141
60.0	89	87	92	94	107	97	102	98	111	93	92	87	90	83	85	84	89
62.5	71	72	78	77	74	77	82	78	76	74	77	71	68	68	74	71	71
65.0	67	66	72	68	67	67	74	68	68	66	70	64	64	63	69	65	67
67.5	64	64	68	65	65	64	69	64	65	62	66	61	61	61	66	63	64
70.0	62	62	65	63	62	61	66	62	63	60	63	59	59	58	62	62	62
72.5	60	59	61	60	60	59	61	60	60	58	59	56	57	56	58	59	60
75.0	58	57	57	56	57	56	58	57	58	56	55	53	54	53	55	56	58
77.5	56	54	55	53	54	53	55	54	56	53	53	51	51	51	53	53	56
80.0	53	52	53	51	52	50	52	52	53	50	51	49	49	48	51	51	53
82.5	50	50	50	49	49	48	49	49	50	48	48	46	46	46	48	48	50
85.0	48	48	47	47	47	47	47	47	47	46	45	45	44	45	46	46	48
87.5	45	46	46	46	45	45	45	45	45	44	44	43	43	44	44	45	46
90.0	45	45	45	45	45	45	44	44	43	43	43	43	43	44	44	44	45

Maximum Candela = **12,541.0** at Horizontal: 337.5°, Vertical: 2.5°

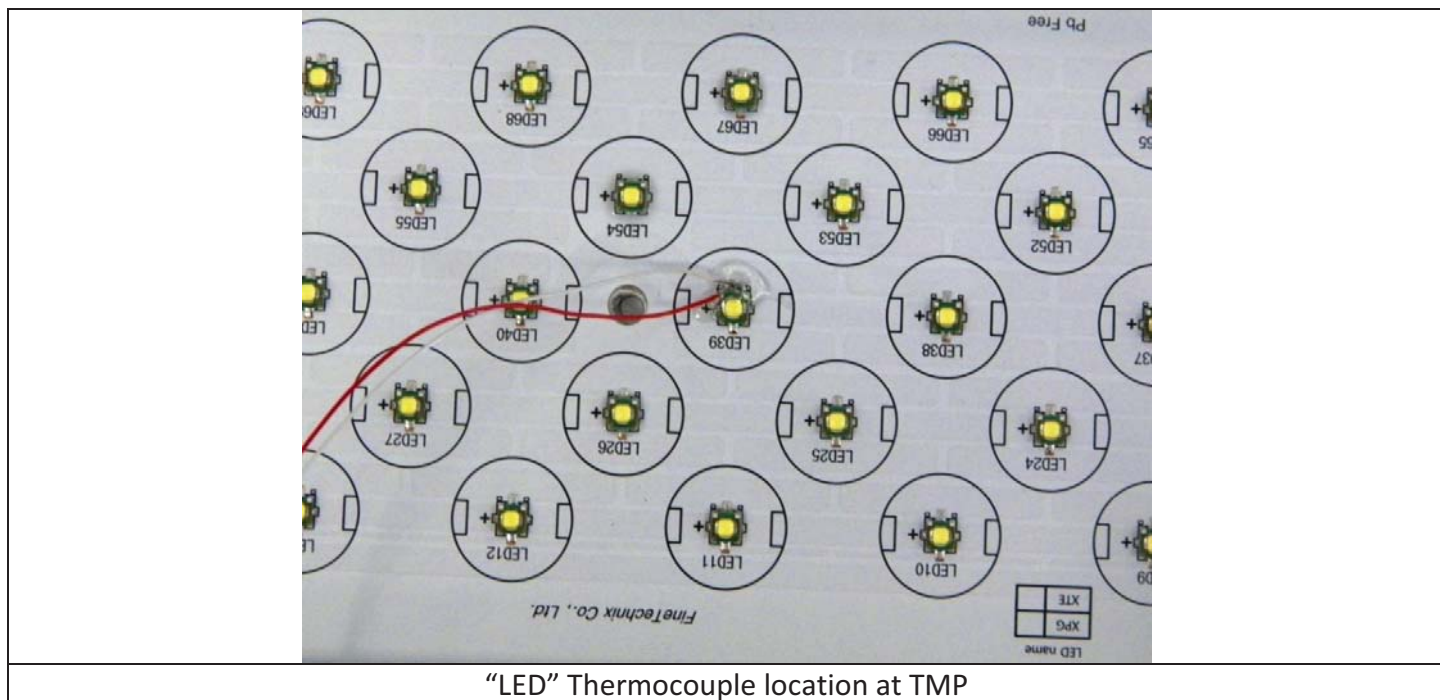


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## ISTMT Temperature Measurement

ISTMT temperature measurement at thermal stabilization (8 hours continuous operation). Thermocouple locations (shown below) are in accordance with manufacturers recommended / stated guidelines for TMP - Temperature Measurement Point.



"LED" Thermocouple location at TMP

## Test Results for Maxlite- ELLF135UM50

<b>LED TMP Temperature</b>	<b>68.5°C</b>
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All temperatures are normalized to 25°C ambient.

## Test Equipment

Description	Manufacturer / Model#	TÜV SÜD Ref#	Calibration Due Date
Thermometer	Fluke 52-II	ATLE0008	11/17/2013





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## Addendum A (DLC Program Results) –

DesignLights Consortium Product Qualification Criteria, Technical Requirements Table, v1.7

9	Architectural Flood and Spot Lighting	Nominal Requirements	Tolerance	Actual Requirement	Measured Results
	Minimum Light Output	1000 lm	-10%	<b>900 lm</b>	<b>12,130 lm</b>
	Zonal Lumen Requirements	≥ 85%: 0-90°	-3%	<b>≥82%</b>	<b>100%</b>
	Minimum Luminaire Efficacy	60 lm/W	-3%	<b>58.2 lm/W</b>	<b>88.03 lm/w</b>
	Allowable CCTs (ANSI C78.377-2008)	≤5700K	Defined by ANSI C78.377	<b>≤5700K</b>	<b>5114 K</b>
	Minimum CRI	65	-2 points	<b>63</b>	<b>76.1</b>
	L70 Lumen Maintenance	50,000 hrs	None	<b>50,000 hrs</b>	<b>D&amp;R Review</b>
	Minimum Luminaire Warranty	5 years	None	<b>5 Years</b>	<b>D&amp;R Review</b>
	Power Factor	≥ 0.9	-3%	<b>0.873</b>	<b>0.994 (120V) 0.928 (277V)</b>
	Total Harmonic Distortion (THD-A%)	≤20%	+5%	<b>25%</b>	<b>7.18% (120V) 12.9% (277V)</b>



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## TÜV SÜD Photometric Testing Information

Testing is performed in accordance with the procedures outlined in IESNA LM79-2008. The sample is evaluated for photometric and electrical characteristics using an integrating sphere and a goniophotometer, located in an accredited, temperature and humidity-controlled, draft free photometric laboratory.

### *Sphere Geometry*

The integrating spheres used for measurement utilize a “ $4\pi$  geometry” configuration in accordance with section 9 of IES LM-79-2008 and is applicable for all types of SSL products (directional and non-directional light projections). The spectroradiometer is an array-type detector manufactured and calibrated by Labsphere (Model# CDS1100).

### *Self-Absorption Correction*

The integrating sphere uses self-absorption correction to eliminate errors due to mismatches between the standard reference lamp and the test samples being measured. This auxiliary correction lamp is a halogen type lamp powered by a calibrated Lamp Power Supply manufactured and calibrated by Labsphere (model LPS150). Ambient temperature is measured using a thermocouple located inside the integrating sphere at the same height as the sample under test (UUT) and not more than 1 meter in horizontal distance away from the sample (section 2.2 of LM79-2008). The thermocouple is located behind a baffle in order to eliminate any direct optical radiation from the sample under test.

### *Sample Stabilization*

The sample (UUT) is placed inside the integrating sphere and powered by a regulated and conditioned alternating or direct current supply. The stabilization times shown on the results pages of this report denote the time of the 3<sup>rd</sup> measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization in accordance with section 5.0 of LM79-2008.

### *Sphere Calibration*

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

Manufacturer: EYE Lighting International  
Model# J94/JD28V75W  
Voltage = 28.0 Volts DC  
Wattage = 75.0 Watts  
Calibration Current = 2.679 Amperes  
Luminous Flux = 1685 Lumens  
Calibration Date = 2-17-2011 (calibrated by Labsphere – NIST traceable).

Continued.....



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## TÜV SÜD Photometric Testing Information (continued)

### Goniophotometer

The Goniophotometer is a Mirror based Type C optical measurement system in accordance with section 9.3.1 of IESNA LM79-2008.

### Goniophotometer Calibration

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

- Manufacturer: General Electric
- Part Number: CSB-110
- Lamp Number: 112-A
- Voltage: 16.52 Volts DC
- Wattage: 150.0 Watts
- Calibration Current: 4.816 Amperes
- Luminous Intensity: 151.5 Candelas
- Calibration Date: 02-13-2011 (NIST traceable)

## TÜV SÜD Test Equipment List:

TÜV SÜD Sphere System – contains the following:			
Description	Manufacturer / Model#	TÜV SÜD Ref#	Calibration Due Date
Integrating Sphere	Labsphere LM760	SPH003	weekly
Spectroradiometer	Labsphere CDS1100	ATLE0048	9/7/2016
Power Analyzer	Yokogawa WT210	ATLE0058	3/7/2013
Power Source	Chroma 61602	AC003	N/A
Thermometer	Fluke 52-II	ATLE0008	11/17/2013
TÜV SÜD Mirror Goniophotometer System – contains the following:			
Goniophotometer	M.E. GONC02	GON002	weekly
Spectroradiometer	Gigahertz Optik P9801	GIG002	weekly
Power Analyzer	Yokogawa WT210	ATLE0031	11/16/2013
Power Source	Chroma 61603	AC007	N/A

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