



# IESNA LM79-2008 Test Report

TÜV SÜD America

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

Report Prepared for:

**David Delgado**  
Applications Engineer

**Maxlite Inc.**  
12 York Ave.  
West Caldwell, NJ 07006  
United States

Telephone: (800) 555-5629

**Sample Tested:** ELLF135UW50  
**Sample Description:** LED Architectural Flood/Spot Luminaire  
**Manufacturer:** Maxlite, Inc.

**Technical Report Number:** JI1300936-02-LM79  
**Report Issue Date:** February 4<sup>th</sup> 2013  
**Total Number of Pages:** 11 (including this page)

**Report Prepared by:**

**Byrd Evans**  
TÜV SÜD Project Handler

**Report Reviewed by:**

**Bryan Cubitt**  
TÜV SÜD Program Manager





# IESNA LM79-2008 TEST REPORT

February 04, 2013

## Summary of Key Test Results

Model# **ELLF135UW50**  
 Manufacturer **Maxlite, Inc.**  
 TÜV Sample# **581-2**  
 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>11,760 Lumens</b>
Input Power	<b>135.95 Watts</b>
Efficacy	<b>86.50 Lumens/Watt</b>
C.C.T.	<b>5161 K</b>
C.R.I. (R <sub>a</sub> )	<b>76.2</b>
Beam Angle	<b>120.3°</b>
Stabilization Time	<b>75 minutes</b>
In-Situ Temp Test (ISTMT)**	<b>65.0°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- ELLF135UW50	
	Integrating Sphere	Goniophotometer
Total Luminous Flux (Lumens)	11,760.0	11,610.3
Luminous Efficacy (Lumens/Watt)	86.50	85.39
Total Radiant Flux (Watts)	37.4	-
Correlated Color Temperature (CCT)	5161	-
Color Rendering Index (CRI – R <sub>a</sub> )	76.2	-
R <sub>9</sub> Value	0.1	-
Chromaticity (Chroma x / Chroma y)	0.3402 / 0.3415	-
Chromaticity (Chroma u / Chroma v)	0.2120 / 0.3193	-
Chromaticity (Chroma u' / Chroma v')	0.2120 / 0.4789	-
D <sub>uv</sub> Value	-0.00312	-

Electrical Results (120V unless stated otherwise)	Maxlite- ELLF135UW50	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	135.95	135.96
Input Voltage (Volts AC)	120.0	120.0
Input Current (Amps)	1.140	1.140
Power Factor @120VAC	0.994	0.997
Power Factor @277VAC	0.926	N/A
Input Frequency (Hertz)	60.0	60.0
A-THD @120VAC (Current %)	6.97 %	7.41 %
A-THD @277VAC (Current %)	12.99 %	N/A

Additional Parameters	Maxlite- ELLF135UW50	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	75 minutes	71 minutes
Test Geometry Configuration	4π	Type C
Ambient Temperature	25.3°C	24.7°C
ISTMT (In-Situ Temperature Measurement)	65.0°C (LED)	
Spacing Criteria	1.32 (0° – 180°) / 1.38 (90° – 270°)	



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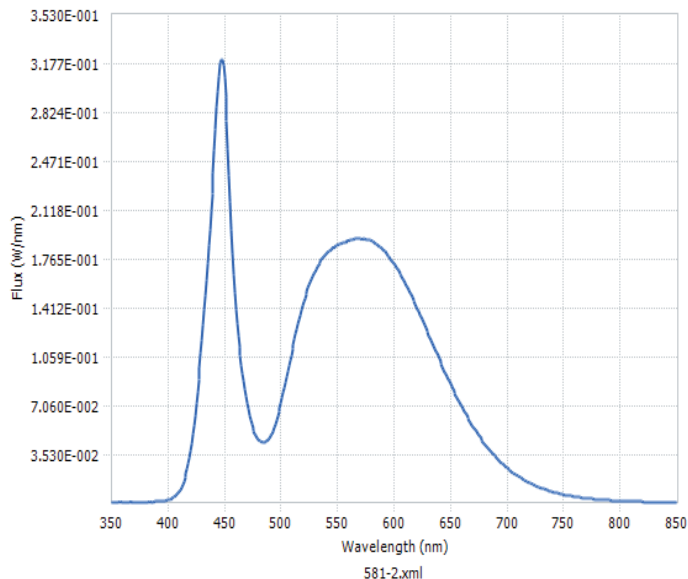
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## Spectral Flux and Chromaticity Diagram

### Spectral Flux

### Chromaticity Diagram

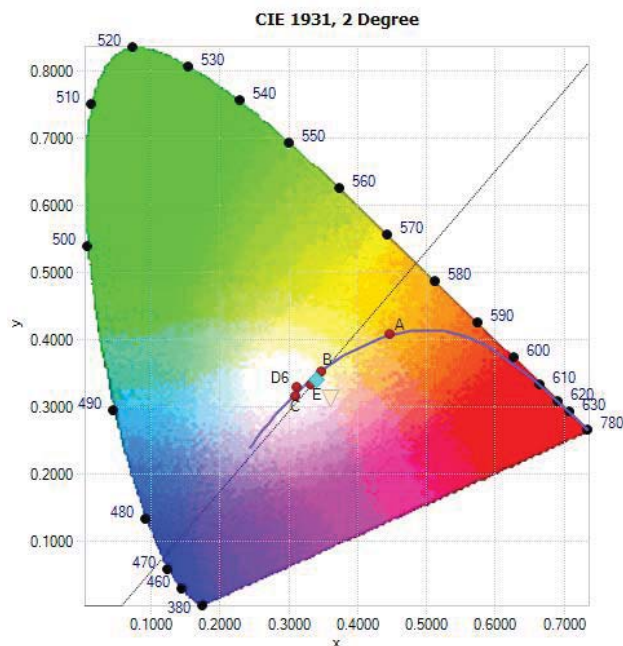
▼ SPECTRAL FLUX GRAPH:



Spectral response of the Radiant Flux

(350nm to 850nm)

▼ CHROMATICITY DIAGRAM:



Tristimulus values (from page 5):

$$x / y = 0.3402 / 0.3415$$

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

## Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	9,540.2	82.2 %
60 - 90	2,070.1	17.8 %
0 - 90	11,610.3	100 %
90 - 180	0.0	0 %
0 - 180	11,610.3	100 %

TÜV SÜD America, Inc.  
5945 Cabot Parkway, Suite 100,  
Alpharetta GA 30005

Telephone: 678-341-5900 www.tuvamerica.com

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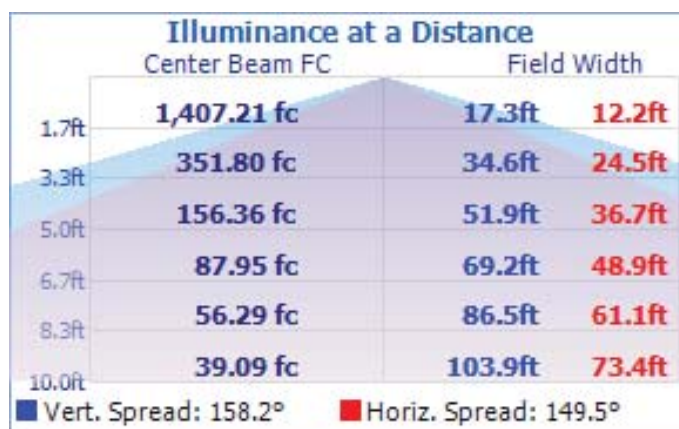
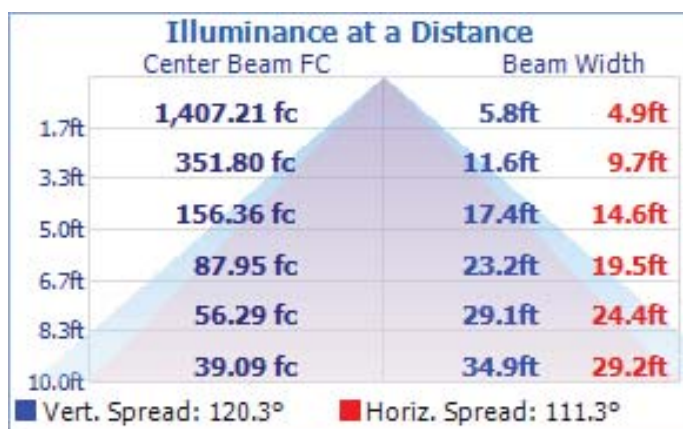


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## Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.

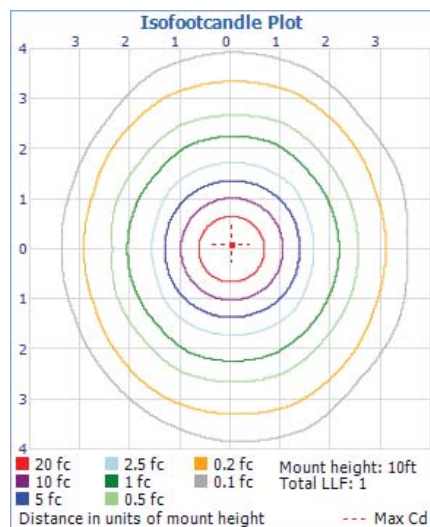


Beam Angle = 120.3°

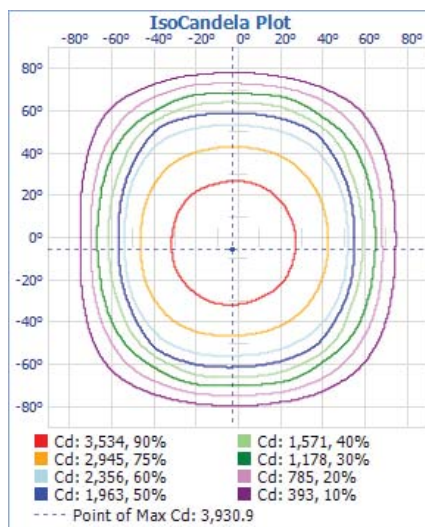
Field Angle = 158.2°

## Test Results – Candela Plots

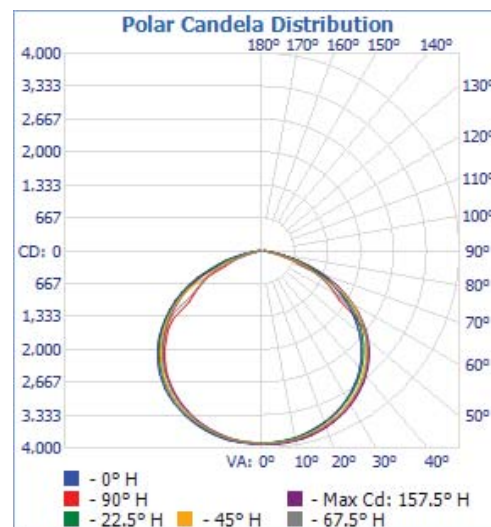
The following images depict the luminous intensity distribution characteristics of the luminaire:



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	3909	3909	3909	3909	3909	3909	3909	3909	3909	3909	3909	3909	3909	3909	3909	3909	3909
2.5	3904	3897	3903	3909	3911	3909	3902	3925	3916	3896	3900	3897	3894	3896	3905	3913	3904
5.0	3890	3884	3900	3910	3911	3908	3910	<b>3931</b>	3914	3892	3889	3902	3884	3883	3882	3898	3891
7.5	3880	3869	3897	3891	3902	3903	3908	3928	3905	3889	3881	3884	3875	3872	3865	3884	3880
10.0	3859	3852	3883	3883	3890	3898	3904	3909	3896	3874	3866	3853	3853	3847	3842	3865	3858
12.5	3822	3827	3851	3871	3884	3883	3886	3898	3876	3851	3841	3828	3817	3812	3812	3834	3822
15.0	3781	3796	3822	3837	3870	3862	3852	3871	3850	3821	3807	3798	3782	3778	3776	3799	3780
17.5	3743	3762	3787	3814	3836	3836	3837	3838	3817	3788	3766	3747	3753	3730	3732	3745	3743
20.0	3702	3718	3749	3778	3802	3807	3809	3805	3778	3754	3728	3714	3707	3685	3676	3696	3702
22.5	3648	3663	3705	3726	3758	3770	3762	3763	3733	3707	3682	3660	3647	3633	3627	3648	3647
25.0	3590	3614	3647	3688	3712	3728	3727	3713	3687	3654	3630	3597	3583	3569	3571	3580	3590
27.5	3528	3545	3600	3626	3663	3672	3677	3664	3622	3592	3580	3538	3518	3494	3490	3516	3528
30.0	3459	3476	3527	3566	3587	3612	3615	3604	3566	3522	3508	3458	3442	3419	3424	3441	3460
32.5	3376	3409	3469	3496	3518	3552	3544	3538	3496	3453	3432	3383	3353	3334	3348	3364	3376
35.0	3287	3326	3394	3423	3449	3474	3476	3454	3422	3368	3345	3289	3265	3249	3270	3273	3287
37.5	3202	3231	3302	3337	3368	3404	3405	3374	3324	3281	3254	3195	3162	3153	3176	3186	3202
40.0	3088	3135	3196	3252	3274	3308	3319	3281	3234	3178	3138	3086	3050	3042	3056	3078	3088
42.5	2979	3029	3102	3142	3164	3208	3213	3181	3114	3067	3025	2973	2922	2927	2947	2970	2980
45.0	2855	2910	2991	3029	3045	3100	3108	3065	2994	2952	2910	2842	2790	2795	2834	2846	2856
47.5	2718	2788	2874	2902	2911	2975	2987	2941	2865	2819	2773	2701	2638	2659	2706	2718	2718
50.0	2575	2651	2756	2773	2760	2836	2863	2808	2719	2680	2626	2549	2487	2509	2570	2580	2575
52.5	2417	2508	2613	2628	2594	2674	2710	2656	2551	2527	2475	2391	2279	2351	2417	2427	2417
55.0	2254	2346	2458	2452	2263	2493	2525	2486	2386	2361	2299	2187	1794	2086	2240	2262	2254
57.5	2089	2174	2273	2105	1855	2108	2353	2310	2210	2170	2111	1698	1632	1657	2057	2072	2090
60.0	1914	1988	2091	1723	1704	1739	2157	2102	2027	1983	1907	1512	1481	1499	1855	1892	1914
62.5	1718	1794	1860	1557	1536	1567	1916	1907	1832	1776	1686	1355	1320	1338	1495	1696	1718
65.0	1518	1581	1476	1377	1361	1385	1459	1698	1625	1568	1248	1196	1148	1166	1190	1496	1518
67.5	1299	1380	1178	1188	1166	1203	1234	1468	1409	1366	1071	1021	793	987	1020	1280	1300
70.0	1046	1140	984	898	802	898	1038	1241	1133	1134	892	682	656	662	843	1034	1046
72.5	862	915	796	657	663	678	839	983	940	894	716	557	528	537	652	823	863
75.0	655	711	505	520	407	537	551	745	746	699	434	337	317	323	408	540	656
77.5	476	436	360	306	301	317	397	479	534	424	321	241	172	202	273	377	477
80.0	312	286	202	159	156	165	221	324	361	279	175	115	85	85	156	236	312
82.5	175	145	105	81	82	81	114	171	207	139	87	74	74	73	71	123	175
85.0	80	76	66	69	70	69	66	85	98	74	62	64	63	63	61	62	80
87.5	44	50	54	55	55	56	55	51	48	48	49	49	48	47	46	47	44
90.0	37	37	37	39	40	40	39	37	36	35	35	35	35	35	35	36	37

Maximum Candela = **3,930.9** at Horizontal: 157.5°, Vertical: 5.0°

TUV SUD America, Inc.  
5945 Cabot Parkway, Suite 100,  
Alpharetta GA 30005

Telephone: 678-341-5900 www.tuvamerica.com



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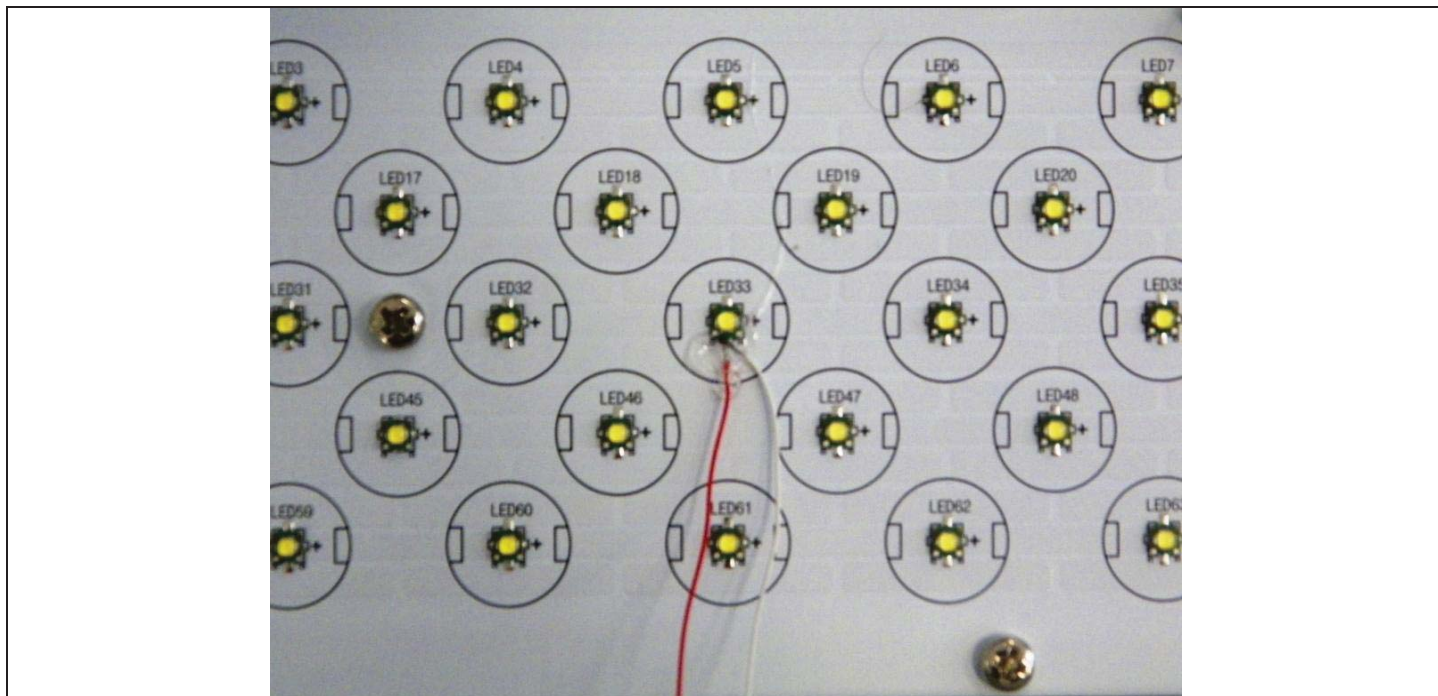


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## ISTMT Temperature Measurement

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- ELLF135UW50

<b>LED TMP Temperature</b>	<b>65.0°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>11,760 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>86.50 lm/w</b>
	Allowable CCTs (ANSI C78.377-2008)	≤5700K	Defined by ANSI C78.377	<b>≤5700K</b>	<b>5161 K</b>
	Minimum CRI	65	-2 points	<b>63</b>	<b>76.2</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) 0.926 (277V)</b>
	Total Harmonic Distortion (THD-A%)	≤20%	+5%	<b>25%</b>	<b>6.97% (120V) 12.99% (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.....

**TÜV SÜD America, Inc.**

5945 Cabot Parkway, Suite 100,  
Alpharetta GA 30005

Telephone: 678-341-5900 [www.tuvamerica.com](http://www.tuvamerica.com)

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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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**TÜV SÜD America, Inc.**  
5945 Cabot Parkway, Suite 100,  
Alpharetta GA 30005

Telephone: 678-341-5900 www.tuvamerica.com



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