



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:	ELLF180UN50
Sample Description:	LED High-Bay Luminaire for Commercial and Industrial buildings
Manufacturer:	Maxlite, Inc.
Technical Report Number:	J11402106-01-LM79
Report Issue Date:	April 18th, 2014
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Report Prepared by:

Byrd Evans
TÜV SÜD Project Handler

Report Reviewed by:

Bryan Cubitt
TÜV SÜD Program Manager



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Summary of Key Test Results

Model# **ELLF180UN50**

Manufacturer **Maxlite, Inc.**

TÜV Sample# 1243-1

Date of Test April 18th 2014

Notes: Tested in intended orientation
(Horizontal)



Parameter	Measured Result
Luminous Flux	17,120 Lumens
Input Power	177.78 Watts
Efficacy	96.30 Lumens/Watt
C.C.T.	5733 K
C.R.I. (R _a)	75.7
Beam Angle	18.7°
Stabilization Time	60 minutes
In-Situ Temp Test (ISTMT)**	83.4°C (LED)

The above results are recorded / derived from measurements in accordance with LM79-08.

**ISTMT in accordance with “Energy Star Program Requirements for Luminaires – Version 1.2”.



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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- ELLF180UN50	
	Integrating Sphere	
Total Luminous Flux (Lumens)	17,120	
Luminous Efficacy (Lumens/Watt)	96.30	
Total Radiant Flux (Watts)	53.4	
Correlated Color Temperature (CCT)	5733	
Color Rendering Index (CRI – R _a)	75.7	
R ₉ Value	-23.9	
Chromaticity (Chroma x / Chroma y)	0.3271 / 0.3433	
Chromaticity (Chroma u / Chroma v)	0.2024 / 0.3186	
Chromaticity (Chroma u' / Chroma v')	0.2024 / 0.4779	
D _{uv} Value	0.00355	

Electrical Results (120V unless stated otherwise)	Maxlite- ELLF180UN50	
	Integrating Sphere	
Input Power (Watts)	177.78	
Input Voltage (Volts AC)	120.04	
Input Current (Amps)	1.488	
Power Factor @120VAC	0.996	
Power Factor @277VAC	0.937	
Input Frequency (Hertz)	60.0	
A-THD @120VAC (Current %)	5.54 %	
A-THD @277VAC (Current %)	11.13 %	

Additional Parameters	Maxlite- ELLF180UN50	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	60 minutes	54 minutes
Test Geometry Configuration	4π	Type C
Ambient Temperature	24.1°C	24.5°C
ISTMT (In-Situ Temperature Measurement)	83.4°C (LED)	
Spacing Criteria	0.30 (0° – 180°) / 0.36 (90° – 270°)	



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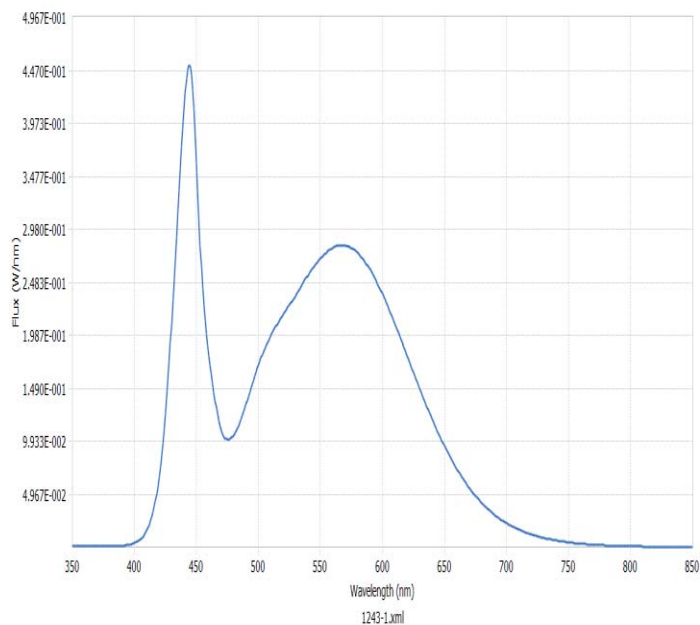
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Spectral Flux and Chromaticity Diagram

Spectral Flux

▼ SPECTRAL FLUX GRAPH:

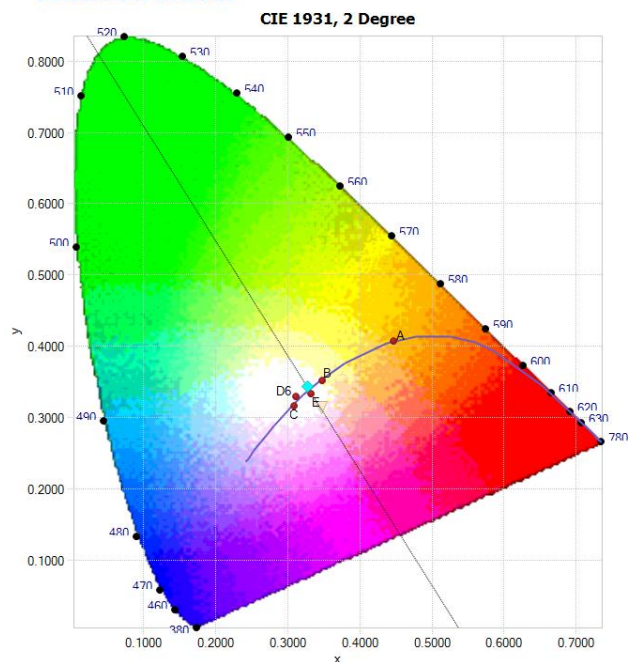


Spectral response of the Radiant Flux

(350nm to 850nm)

Chromaticity Diagram

▼ CHROMATICITY DIAGRAM:



Tristimulus values (from page 5):

$$x / y = 0.3271 / 0.3333$$

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

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	16,271.6	98.5 %
60 - 90	240.2	1.5 %
0 - 90	16,511.9	100 %
90 - 180	0.0	0.0 %
0 - 180	16,511.9	100 %

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

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

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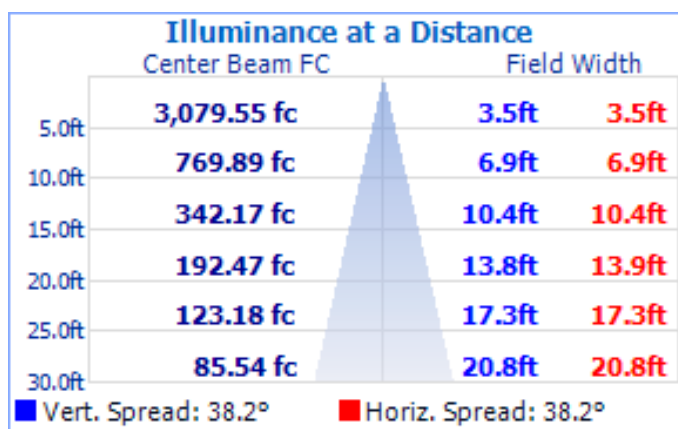
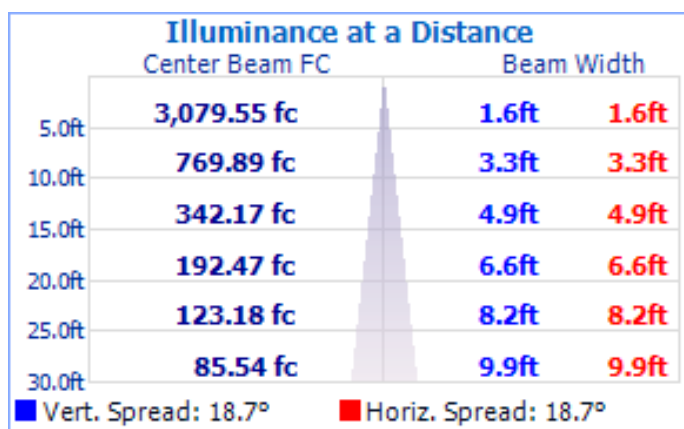


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Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.

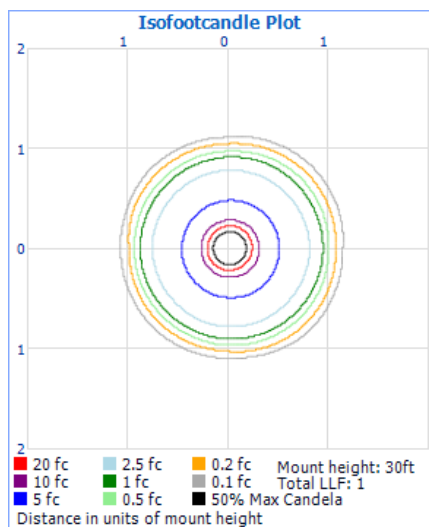


Beam Angle = 18.7°

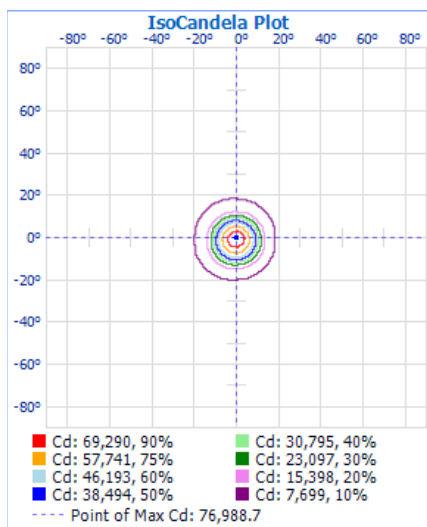
Field Angle = 38.2°

Test Results – Candela Plots

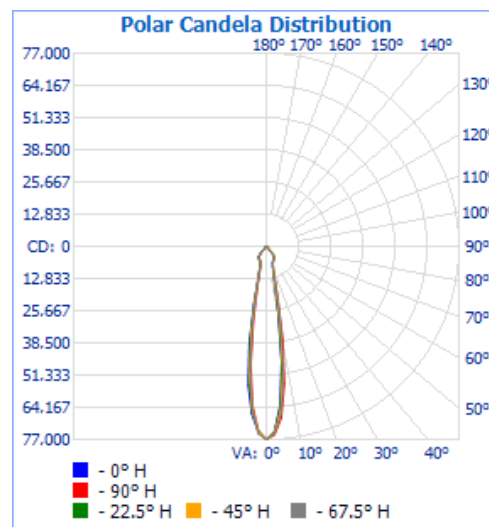
The following images depict the luminous intensity distribution characteristics of the luminaire:



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	76989	76989	76989	76989	76989	76989	76989	76989	76989	76989	76989	76989	76989	76989	76989	76989	76989
2.5	73784	73882	74228	74648	75211	76101	75410	74867	74140	73693	73896	74784	73441	72896	72915	73092	73784
5.0	63273	64112	65474	67034	68632	69855	69796	68286	67076	66154	65193	64723	63643	62277	62011	62486	63273
7.5	46242	47571	50213	52911	55246	57028	57785	57090	55664	53850	51668	49789	47776	45813	44822	44826	46242
10.0	27140	28445	31531	35015	37799	39901	41351	41644	39775	37388	34794	32303	29884	28331	26928	26260	27140
12.5	15380	16003	17693	19756	21244	23420	24844	24915	23204	21509	20068	18327	16502	15979	15341	15054	15380
15.0	10397	10735	11346	12142	12714	13664	13871	13306	12443	11744	11514	10952	10231	10229	10155	10195	10397
17.5	8224	8523	8810	9121	9343	9630	9478	9133	8708	8453	8248	8082	7883	7938	7976	8086	8224
20.0	7159	7388	7559	7697	7778	7905	7810	7633	7408	7237	7071	6953	6896	6942	6971	7040	7159
22.5	6576	6743	6871	6933	6947	7042	6988	6878	6738	6612	6500	6417	6388	6406	6423	6469	6576
25.0	6203	6332	6443	6481	6498	6568	6549	6475	6370	6258	6167	6094	6069	6065	6066	6102	6203
27.5	5921	6034	6140	6170	6219	6269	6257	6203	6107	6006	5921	5851	5822	5811	5795	5829	5921
30.0	5695	5801	5900	5938	5995	6047	6034	5983	5890	5796	5718	5649	5613	5593	5564	5611	5695
32.5	5496	5592	5680	5754	5810	5862	5847	5793	5697	5605	5528	5464	5432	5384	5349	5403	5496
35.0	5261	5370	5444	5549	5641	5671	5651	5603	5518	5378	5270	5232	5197	5045	5019	5134	5261
37.5	4520	4780	4934	5102	5353	5301	5244	5210	5128	4861	4657	4539	4459	4243	4215	4375	4520
40.0	3203	3492	3767	4062	4352	4331	4254	4203	4007	3697	3426	3219	3069	2875	2832	2970	3203
42.5	1699	1957	2226	2544	2812	2817	2787	2697	2470	2162	1918	1706	1523	1439	1400	1455	1699
45.0	571	771	1000	1148	1229	1385	1444	1320	1039	891	801	663	491	509	543	538	571
47.5	272	319	403	404	377	543	604	484	339	347	337	299	266	249	275	269	272
50.0	216	218	234	225	241	258	288	254	245	244	244	221	212	203	222	215	216
52.5	180	183	192	194	208	202	224	210	214	208	210	188	188	170	184	179	180
55.0	143	143	154	158	172	176	183	193	193	179	176	159	159	142	143	139	143
57.5	106	107	117	120	135	138	140	152	148	137	135	126	122	112	105	104	106
60.0	87	88	93	98	106	106	108	111	112	104	101	96	91	89	86	87	87
62.5	84	84	84	85	87	89	88	87	85	85	85	85	84	84	84	84	84
65.0	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
67.5	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
70.0	83	83	84	84	84	84	84	84	84	84	84	84	84	83	83	83	83
72.5	82	83	83	84	83	84	83	83	83	83	83	83	83	83	82	82	82
75.0	81	80	81	83	83	83	83	82	83	83	82	82	82	82	81	79	81
77.5	76	77	78	81	83	81	81	82	81	81	80	81	81	79	76	75	76
80.0	75	73	75	79	80	81	79	79	77	76	77	78	78	75	71	69	75
82.5	64	68	69	75	76	77	76	74	72	73	73	73	71	68	65	61	64
85.0	59	61	64	69	74	71	70	70	67	67	64	65	66	63	60	58	59
87.5	56	58	62	64	67	67	64	68	63	62	60	61	61	62	58	58	56
90.0	0	0	0	0	62	66	62	65	63	63	60	62	62	0	0	0	0

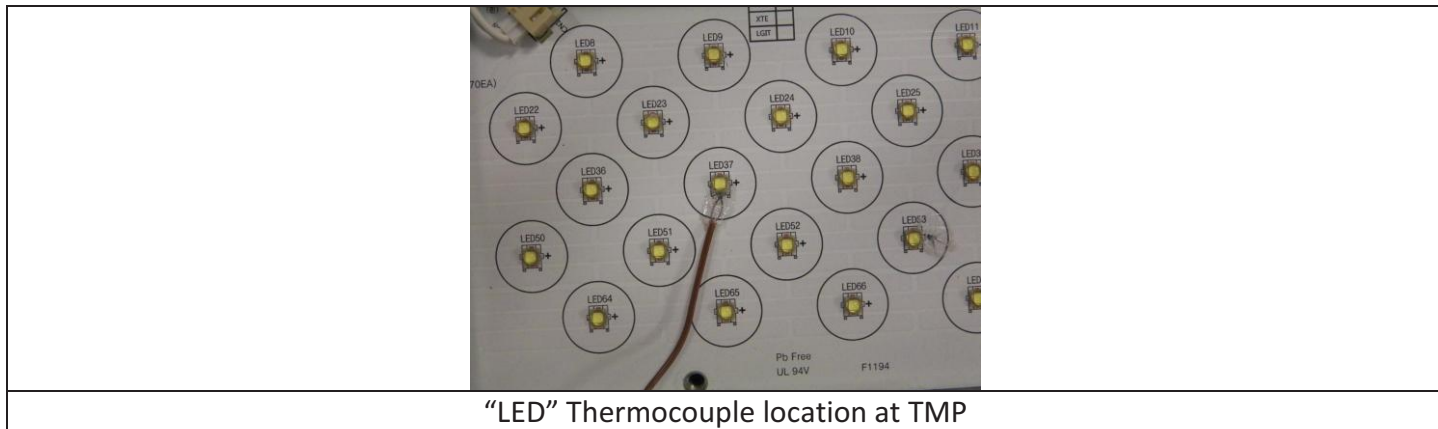
Maximum Candela = **76988.7** at Horizontal: 0.0°, Vertical: 0.0°

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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.



Test Results for Maxlite- ELLF180UN50

LED TMP Temperature	83.4°C
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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	ATLE0118	1/16/2015



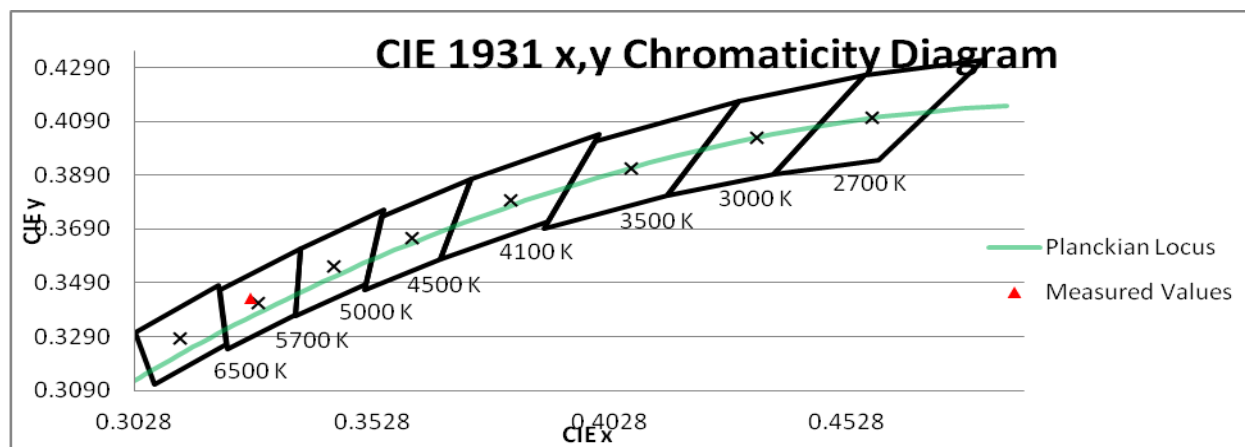
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Addendum A (DLC Program Results) –

DesignLights Consortium Product Qualification Criteria, Technical Requirements Table, v2.1

22	High-Bay Luminaires for Commercial and Industrial buildings	Nominal Requirements	Tolerance	Actual Requirement	Measured Results
	Minimum Light Output	10,000 lm	-10%	9000 lm	17,120 lm
	Zonal Lumen Requirements	≥30% 20-50°	-10%	≥20%	43.1%
	Minimum Luminaire Efficacy	80 lm/W	-3%	77.6 lm/W	96.30 lm/W
	Allowable CCTs (ANSI C78.377-2008)	≤5700K	Defined by ANSI C78.377	≤5700K	5733
	Minimum CRI	70	-2 points	68	75.7
	L70 Lumen Maintenance	35,000 hrs	None	35,000 hrs	
	Minimum Luminaire Warranty	5 years	None	5 Years	
	Power Factor 120 / 277VAC	≥ 0.9	-3%	0.873	0.996 / 0.937
	Total Harmonic Distortion (THD-A%)	≤20%	+5%	25%	5.54 / 11.13





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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 “ 4π 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 3rd 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

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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	9/7/2014
Power Analyzer	Yokogawa WT210	ATLE0032	11/21/2014
Power Source	Chroma 61602	AC003	N/A
Thermometer	Fluke 52-II	ATLE0118	1/16/2015
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	11/21/2014
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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