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:	**MLLHP100N**
Sample Description:	**High-Bay Pendent Round**
Manufacturer:	**Maxlite Inc.**
Technical Report Number:	**72106817-01-LM79**
Report Issue Date:	**June 15th, 2015**
Total Number of Pages:	**9** (including this page)

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Summary of Key Test Results

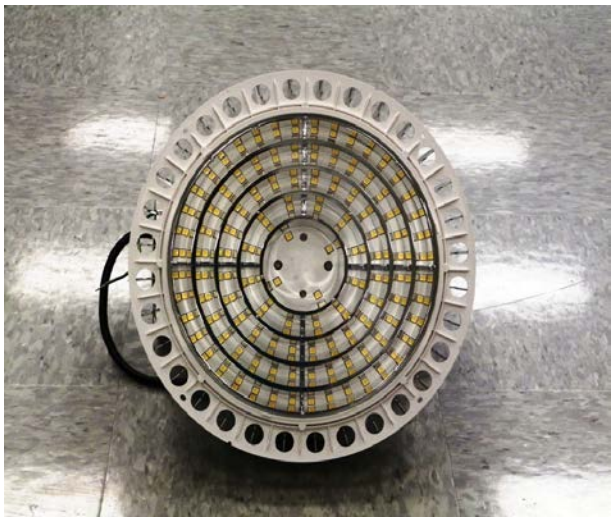
Model# MLLHP100N

Manufacturer Maxlite Inc.

TÜV Sample# 1922-1

Date of Test June 10th 2015

Notes: Tested in intended orientation
(FBH – Fixture Base Horizontal)



Parameter	Measured Result
Luminous Flux	**11,660 Lumens**
Input Power	**99.54 Watts**
Efficacy	**117.4 Lumens/Watt**
C.C.T.	**5056K**
C.R.I. (R_a)	**83.7**
Beam Angle	**71.4° (V) / 70.5° (H)**
Stabilization Time	**60 minutes**
In-Situ Temp Test (ISTMT)**	**52.4°C**

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 : MLLHP100N	
	Integrating Sphere	
Total Luminous Flux (Lumens)	11,660.0	
Luminous Efficacy (Lumens/Watt)	117.14	
Correlated Color Temperature (CCT)	5056	
Color Rendering Index (CRI – R_a)	83.7	
R_9 Value	10.9	
Total Radiant Flux (Watts)	37.0	
Chromaticity (Chroma x / Chroma y)	0.3431	0.3461
Chromaticity (Chroma u / Chroma v)	0.2122	0.3211
Chromaticity (Chroma u' / Chroma v')	0.2122	0.4817
D_{uv} Value	-0.00195	

Electrical Results	Maxlite : MLLHP100N	
	Integrating Sphere (120V / 277V)*	
Sample Number	1922-1	
Input Power (Watts)	99.54	99.37
Input Voltage (Volts AC)	120.06	277.01
Input Current (Amps)	0.842	0.381
Power Factor	0.985	0.943
A-THD (Current %)	16.02	14.68
Input Frequency (Hertz)	60.0	60.0

Additional Parameters	Maxlite : MLLHP100N	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	35 minutes	30 minutes
Test Geometry Configuration	4π	Type C
Spectroradiometer	Labsphere CDS1100	Gigahertz Optik P9801
Ambient Temperature	24.1°C	25.1°C
ISTMT (In-Situ Temperature Measurement)	52.4°C	
Spacing Criteria	N/A (0° – 180°) / N/A (90° – 270°)	

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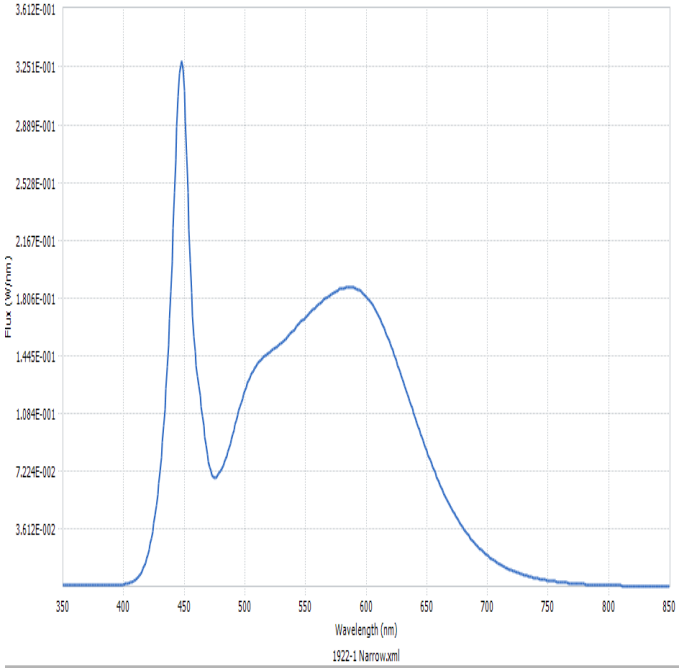
Spectral Flux and Chromaticity Diagram

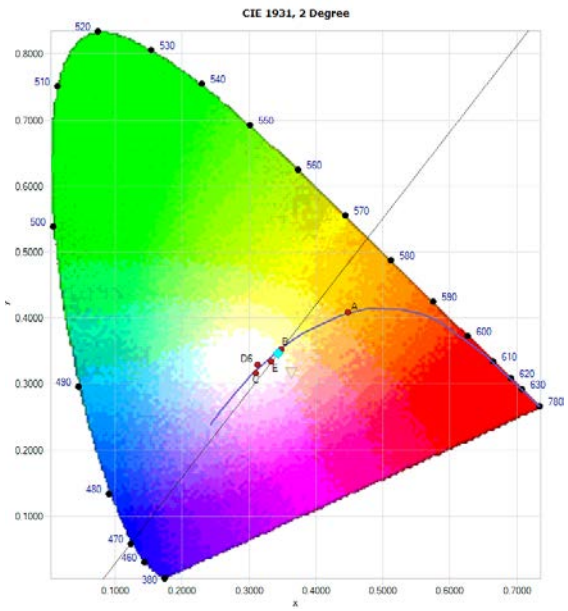
Spectral Flux



Spectral response of the Radiant Flux

(350nm to 850nm)

Chromaticity Diagram



Tristimulus values (from page 4):

x / y = 0.3431 / 0.3461

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

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	10,690.3	94.1%
60 - 90	670.9	5.9%
0 - 90	11,361.2	100.0%
90 - 180	0.0	0.0%
0 - 180	11,361.2	100.0%

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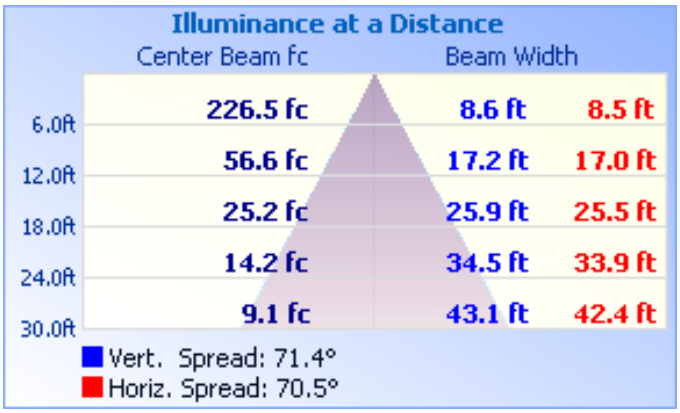
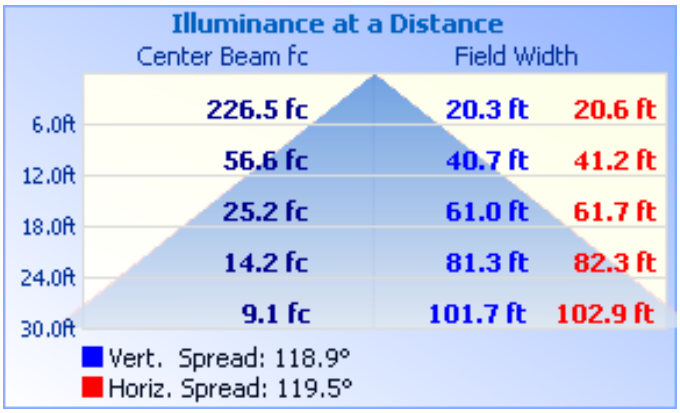
Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.



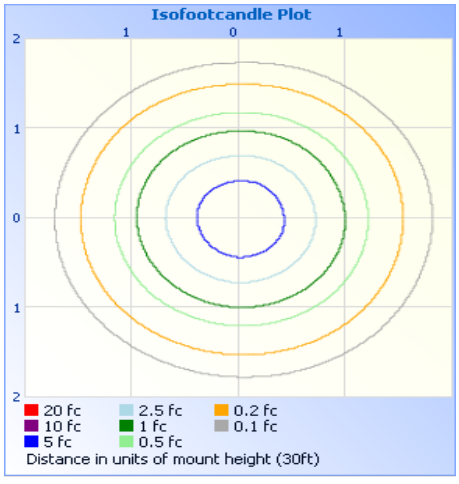


Beam Angle = 71.4° (V) / 70.5° (H)

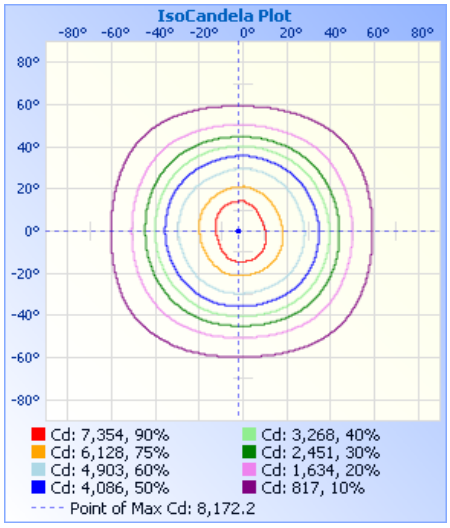
Field Angle = 118.9° (V) / 119.5° (H)

Test Results – Candela Plots

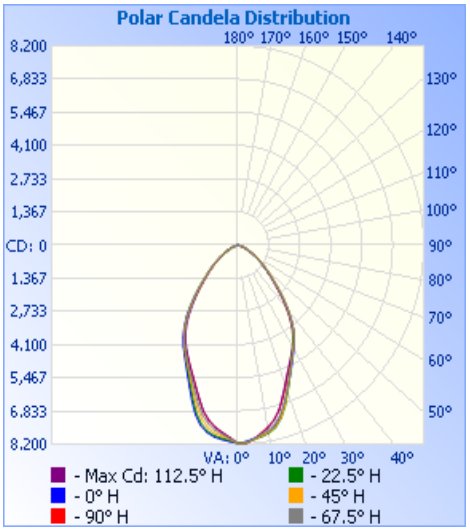
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela

Maximum Candela = **8,172.2** at Horizontal: 112.5°, Vertical: 2.5°

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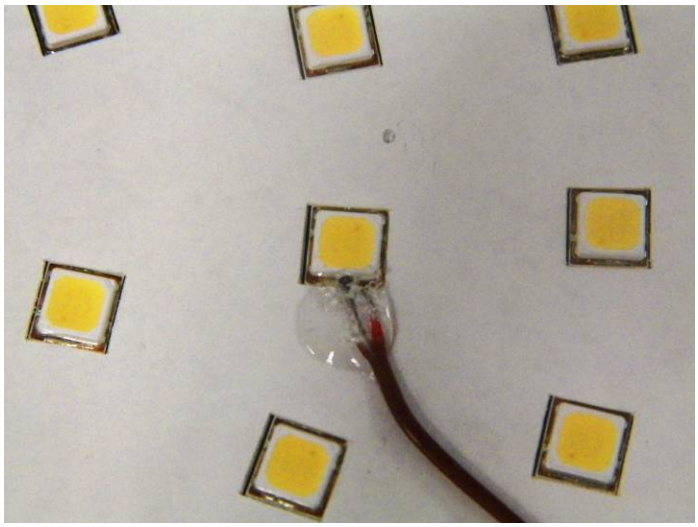
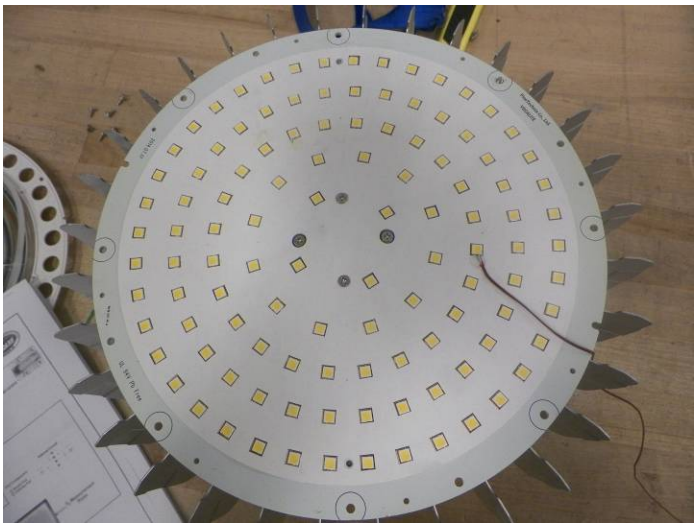
ISTMT Temperature Measurement

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 T_C	Sample Overview (TMP_{LED} location)

Test Results for Maxlite, Inc. : MLLHP100N

LED_{TMP} Temperature	52.4°C

All temperatures are normalized to 25°C ambient.

Test Equipment

Description	Manufacturer / Model#	TÜV SÜD Ref#	Calibration Due Date
Thermometer	Fluke 52-II	ATLE0118	1/15/2016

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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…..

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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	9/7/2015
Power Analyzer	Yokogawa WT210	ATLE0058	3/7/2016
Power Source	Chroma 61602	AC003	N/A
Thermometer	Fluke 52-II	ATLE0008	11/17/2015
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	11/16/2015
Power Source	Chroma 61603	AC007	N/A