FOR THE SCOPE OF
ACCREDITATION UNDER NVLAP LAB
CODE 100402-0.

REPORT

3933 US ROUTE 11, CORTLAND, NEW YORK 13045

Project No. G101618988 Date:May 28 , 2014

REPORT NO. 101618988CRT-052

TEST OF ONE LED FIXTURE

MODEL NO. MF4 MICRO FLOOD LED VERO 13

RENDERED TO

ALTMAN STAGE LIGHTING CO., INC.
57 ALEXANDER STREET
YONKERS, NY 10701

TEST: Electrical and Photometric tests as required to the IESNA test standard.

STATEMENT OF LIMITATION: This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

AUTHORIZATION: The testing performed was authorized by signed quote number 500521118.

STANDARDS USED: The following American National Standards or Illuminating Engineering Society of North America Test Guides were used in part or totally to test each specimen:

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting

ANSI NEMA ANSLG C78.377: 2012: Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number MF4 MICRO FLOOD LED VERO 13. The sample was received by Intertek on May 5, 2014, in undamaged condition and one sample was tested as received. The sample designation was CRT1405051155-010.

DATES OF TESTS: May 23, 2014 through May 27, 2014.

SUMMARY

Model No.:	MF4 MICRO FLOOD LED VERO 13
Description:	LED Fixture

	Result	
Criteria	Sphere	Goniometer
Total Lumen Output (Lumens)	1423	1412
Total Power (W)	25.95	25.93
Luminaire Efficacy (LPW)	54.84	54.45

Criteria	Result
Power Factor	0.997
Current ATHD %	6.20
Correlated Color Temperature (CCT - K)	3047
Color Rendering Index (CRI - Ra)	91.9
Color Rendering Index (CRI - R9)	66.5
DUV	0.002
Chromaticity Coordinate (x)	0.431
Chromaticity Coordinate (y)	0.397
Chromaticity Coordinate (u')	0.250
Chromaticity Coordinate (v')	0.518

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date
Yokogawa Power Analyzer	WT1600	E474	03/07/14	03/07/15
LABSPHERE 3M	W/ CDS 1100	N307	VBU	VBU
Fluke Temperature Meter	53 II	T1318	03/21/14	03/21/15
Elgar Power Supply	CW1251	---	VBU	VBU
Extech Hygro-Thermometer	445703	T1366	11/27/13	11/27/14
SORENSEN POWER SUPPLY	XFR 150-8	---	VBU	VBU
NIST Spectral Flux Standard Source	RF1024	---	09/18/10	100 hrs of use
LSI High Speed Mirror Goniometer	6440	---	04/25/14	05/25/14
Elgar Power Supply	CW1251	---	VBU	VBU
Yokogawa Power Analyzer	WT210	E464	04/17/14	04/17/15
ExTech Hygro Thermometer	445703	T1357	11/25/13	11/25/14
Fisher Scientific	14-649-9	N1405	08/13/13	08/13/14
M-D Building Products	Smart Tool	L112	03/14/14	03/15/15

TEST METHODS

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79.

Photometric and Electrical Measurements – Integrating Sphere Method

A Labsphere Model CDS 1100 CCD Array Spectroradiometer and Two Meter or Ten Foot Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation. Each SSL unit was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

The calibration of the sphere photometer-spectroradiometer system is traceable to the National Institute of Standards and Technology.

Photometric and Electrical Measurements – Distribution Method

A LSI Type C High Speed Model 6440 Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample.

Ambient temperature was measured equal to the height of the sample mounted on the Goniometer equipment. Each sample was operated at input rated voltage in its designated orientation. Each sample was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

Some graphics were created with Photometrics Plus software.

RESULTS OF TEST

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method

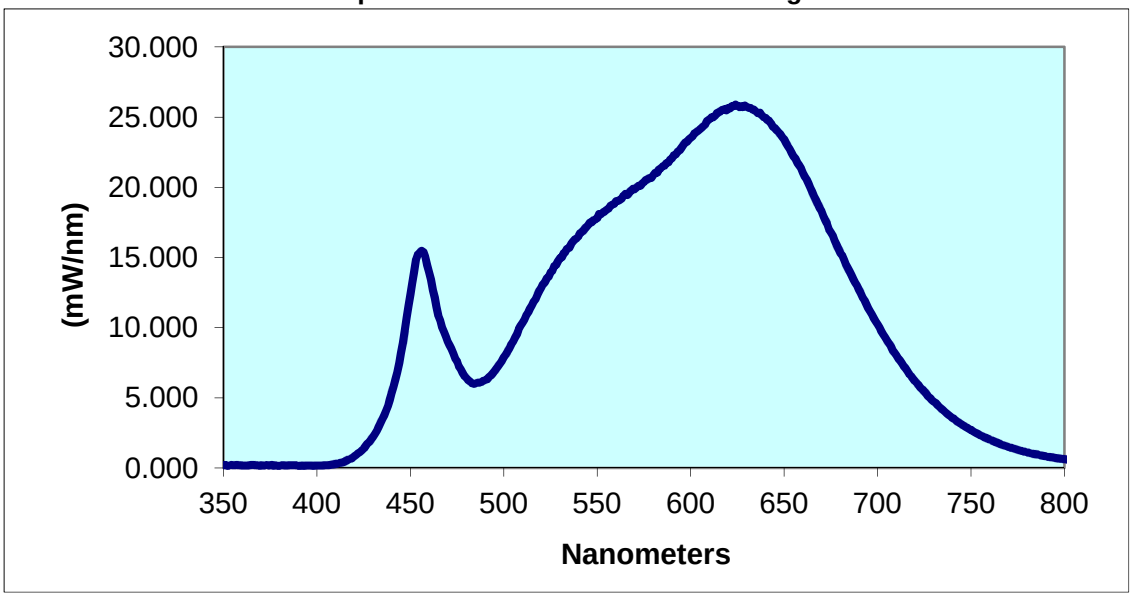
Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)	Luminous Flux (Lumens)	Lumen Efficacy (LPW)
CRT1405051155-010	UP	120.0	216.7	25.95	0.997	6.20	1423	54.84

Correlated Color Temperature (K)	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
3047	91.9	66.5	0.002	0.431	0.397	0.250	0.518

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.181	440	5.297	530	14.950	620	25.650	710	8.031
355	0.184	445	8.177	535	15.680	625	25.810	715	7.108
360	0.173	450	12.390	540	16.490	630	25.730	720	6.197
365	0.212	455	15.350	545	17.280	635	25.390	725	5.444
370	0.183	460	13.980	550	17.820	640	24.970	730	4.720
375	0.189	465	10.830	555	18.380	645	24.220	735	4.131
380	0.146	470	9.018	560	19.000	650	23.400	740	3.562
385	0.183	475	7.570	565	19.520	655	22.210	745	3.103
390	0.152	480	6.383	570	19.860	660	21.050	750	2.692
395	0.157	485	6.024	575	20.370	665	19.680	755	2.312
400	0.157	490	6.248	580	20.870	670	18.310	760	2.013
405	0.194	495	6.860	585	21.490	675	16.770	765	1.736
410	0.275	500	7.868	590	22.050	680	15.330	770	1.487
415	0.454	505	9.026	595	22.800	685	14.020	775	1.273
420	0.822	510	10.350	600	23.530	690	12.720	780	1.106
425	1.381	515	11.580	605	24.150	695	11.380		
430	2.200	520	12.820	610	24.840	700	10.210		
435	3.464	525	13.930	615	25.340	705	9.095		

Spectral Data Over Visible Wavelengths



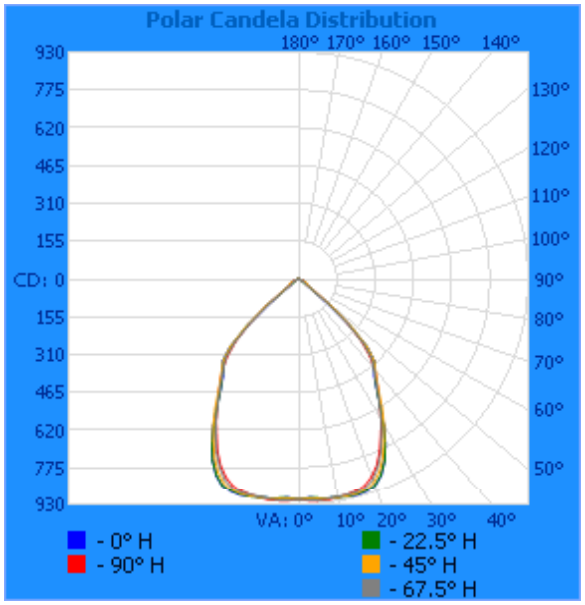
RESULTS OF TEST (cont'd)

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) – Distribution Method

Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
CRT1405051155-010	UP	120.0	216.8	25.93	0.996	1412	54.45

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	908	908	908	908	908
5	908	907	909	915	917
10	913	914	914	911	915
15	922	919	915	909	904
20	904	902	889	875	864
25	822	823	807	786	778
30	689	687	691	669	668
35	551	552	567	557	562
40	476	477	482	474	477
45	391	386	391	366	362
50	137	165	177	156	173
55	42	32	47	36	42
60	36	24	41	21	35
65	25	17	32	14	27
70	11	7	14	7	14
75	2	2	4	2	4
80	0	0	0	0	0
85	0	0	0	0	0
90	0	0	0	0	0

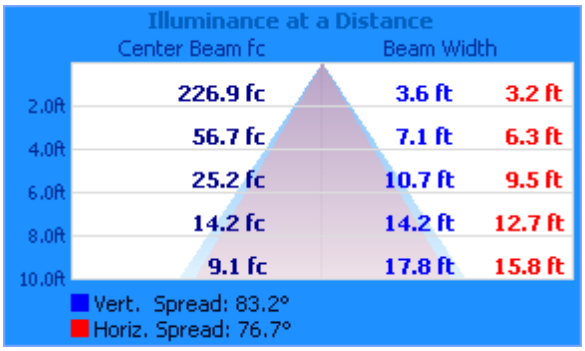


RESULTS OF TEST (cont'd)

Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



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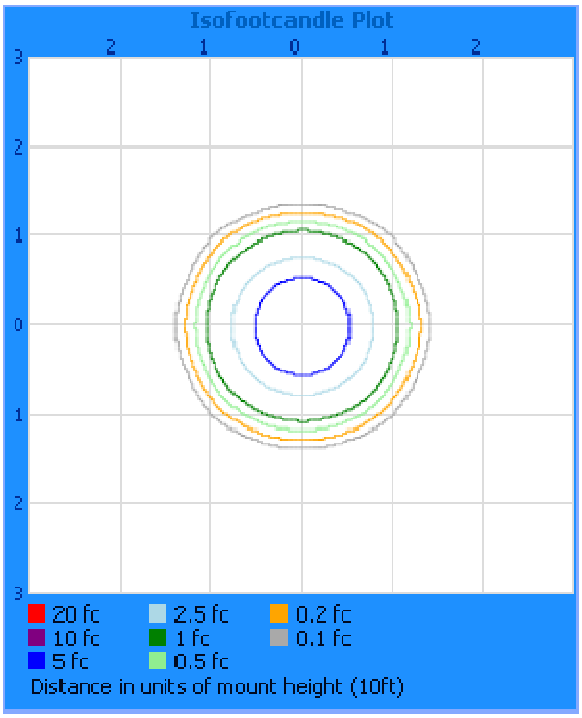

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	709.8	50.3
0-40	1063	75.3
0-60	1388	98.2
60-90	24.8	1.8
0-90	1412	100.0
90-180	0.1	0.0
0-180	1412	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	87.1	6.2
10-20	257.3	18.2
20-30	365.4	25.9
30-40	353.3	25.0
40-50	271.5	19.2
50-60	53.0	3.7
60-70	21.0	1.5
70-80	3.8	0.3
80-90	0.0	0.0

PICTURE (not to scale)

CONCLUSION

The results tabulated in this report are representative of the actual test samples submitted for this report only. The data is provided to the client for further evaluation. Compliance to the referenced specification requirements was not determined in this report.

In Charge Of Tests:

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Report Reviewed By:

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Attachment: None