



PHOTOMETRIC TESTING & EVALUATION TO IES LM-79-08

Sample Tested
LED-PAR38-75-1WD-INF

Prepared for:

Evan O'Sullivan

LEDnovation, Inc.
13053 W. Linebaugh Ave.
Tampa, FL 33626

Phone: 813-891-9600

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Prepared by:

Bryan Cubitt, Technical Team Leader

Approved by:

Steven Longo, Technical Manager



Program Description

Photometric and electrical testing of an “LED-PAR38-75-1WD-INF” replacement lamp to IES LM-79-08.

Executive Summary

Sample Tested = **LED-PAR38-75-1WD-INF**

Luminous Efficacy* (Lumens/Watt)	Luminous Flux* (Lumens)	Input Power* (Watts)	Power Factor*
55.84	755.5	13.53	0.923

CCT (K)*	CRI*	Stabilization Time (Light & Power)
2957.6	82.0	45 minutes

* The above results are recorded / derived from measurements made using an Integrating Sphere



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Sample

The following sample was submitted for evaluation:

LEDnovation, Inc. - **LED-PAR38-75-1WD-INF**

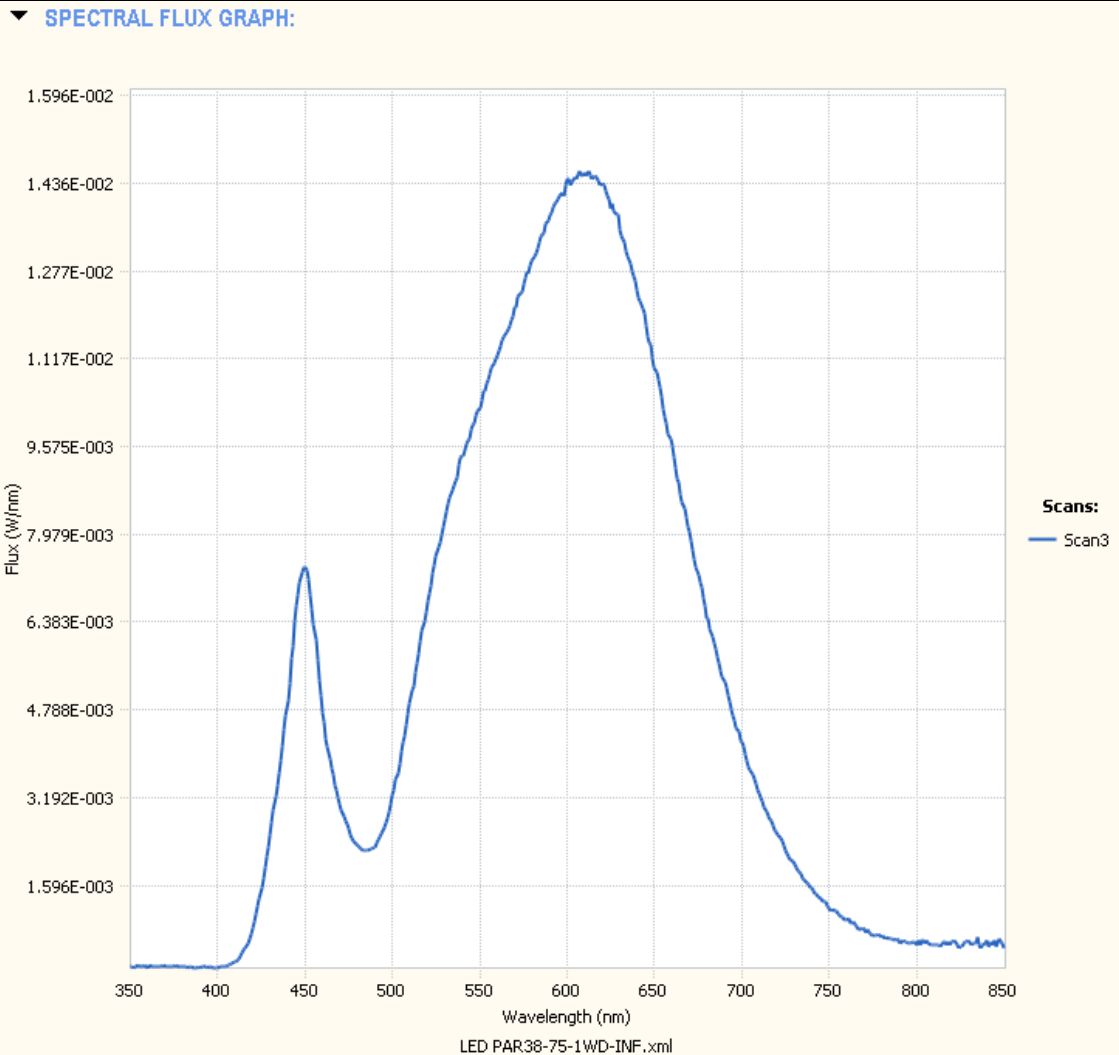


LED-PAR38-75-1WD-INF

Test Results –		
The following results were measured after stabilization of the sample in the Integrating Sphere (unless otherwise stated). Stability is reached when the variation of 3 readings of light output and electrical power, taken 15 minutes apart, is less than 0.50% (in accordance with IES LM-79-08).		
Key Photometric Results	Sample Reference	
	LED-PAR38-75-1WD-INF	
	Integrating Sphere	Goniophotometer
Luminous Efficacy (Lumens/Watt)	55.84	54.89
Total Luminous Flux (Lumens)	755.5	741.0
Total Radiant Flux (Watts)	2.52	
Correlated Color Temperature (CCT)	2957.6	
Color Rendering Index (CRI)	82.0	
Chromaticity (Chroma x / Chroma y)	0.4385 / 0.4024	
Chromaticity (Chroma u / Chroma v)	0.2523 / 0.3473	
Chromaticity (Chroma u' / Chroma v')	0.2523 / 0.5210	
D _{uv} Value	-0.00085	
Stabilization Time (Light and Power)	Approx. 45 minutes	
Total Run Time – Integrating Sphere	52 minutes	
Total Run Time – Goniophotometer	95 minutes	
Spacing Criteria	0.46 (0° – 180°) / 0.48 (90° – 270°)	
Electrical Input Results:	Sample Reference	
	LED-PAR38-75-1WD-INF	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	13.53	13.50
Input Voltage (Volts AC)	120.0	120.0
Input Current (Amps)	0.122	0.125
Input Frequency (Hertz)	60.0	60.0
Power Factor	0.923	0.900
Additional Information	Sample Reference	
	LED-PAR38-75-1WD-INF	
Ambient Temperature	25.3°C	
Integrating Sphere Detector	CDS 600 Spectroradiometer	
Absorption Correction used?	Yes	

Spectral Flux

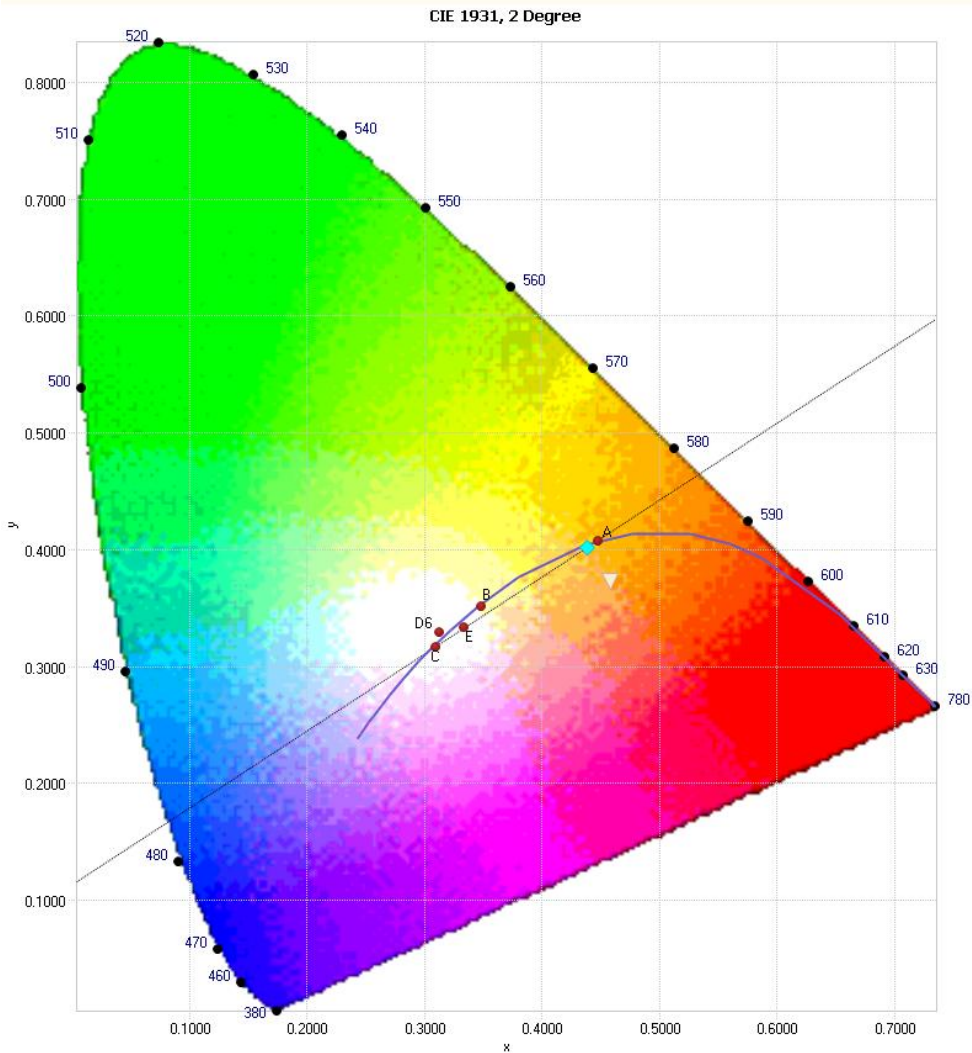
The following graph shows the spectral response curve of the radiant flux for the sample:



Spectral response of the Radiant Flux
(350nm to 850nm – calibrated range of the Spectroradiometer).

Chromaticity Diagram

The following image shows the chromaticity diagram for the sample:



Tristimulus values (from page 5):
x / y = 0.4385 / 0.4024

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

Test Results – Flux Distribution – Zonal Lumen Summary

The following table depicts the zonal lumen distribution for the sample:

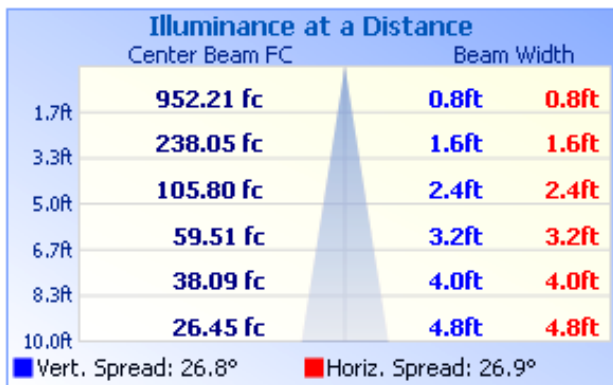
Zone	Lumens	% Total
0 - 10	221.7	29.9%
10 - 20	304.7	41.1%
20 - 30	126.4	17.1%
30 - 40	45.8	6.2%
40 - 50	19.8	2.7%
50 - 60	9.4	1.3%
60 - 70	6.9	0.9%
70 - 80	5.1	0.7%
80 - 90	1.4	0.2%
Total	741.0 Lumens	100%

Zonal Lumen Summary

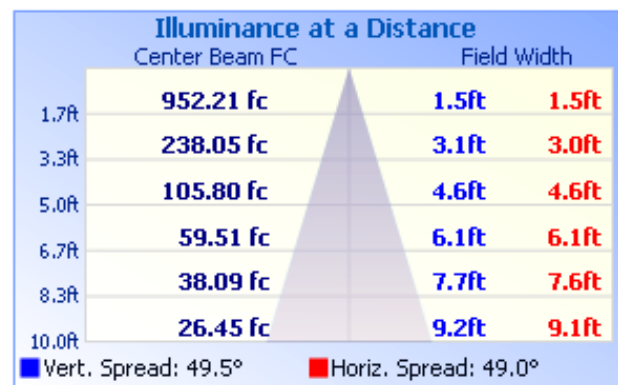
Zone	Lumens	% Lamp / Luminaire
0 - 60	727.6	98.2%
60 - 90	13.4	1.8%
0 - 90	741.0	100%
90 - 180	0.0	0.0%
0 - 180	741.0	100%

Test Results – Illuminance Plots

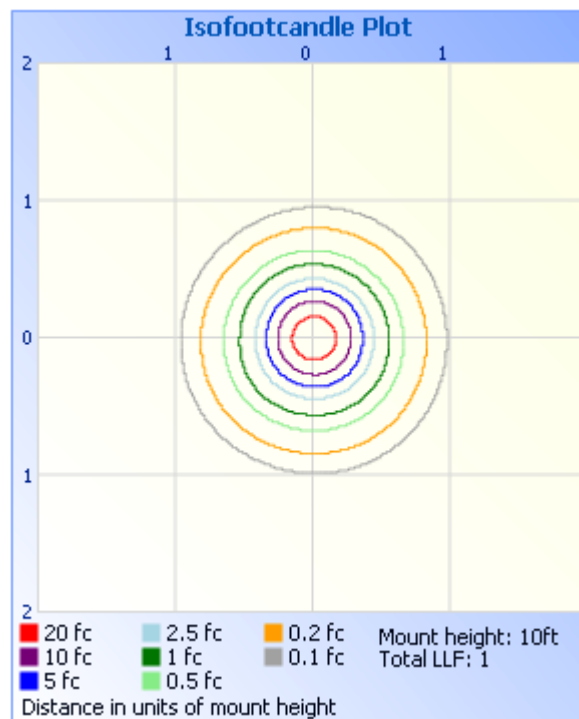
The following images depict the illuminance characteristics of the luminaire.



Beam Angle



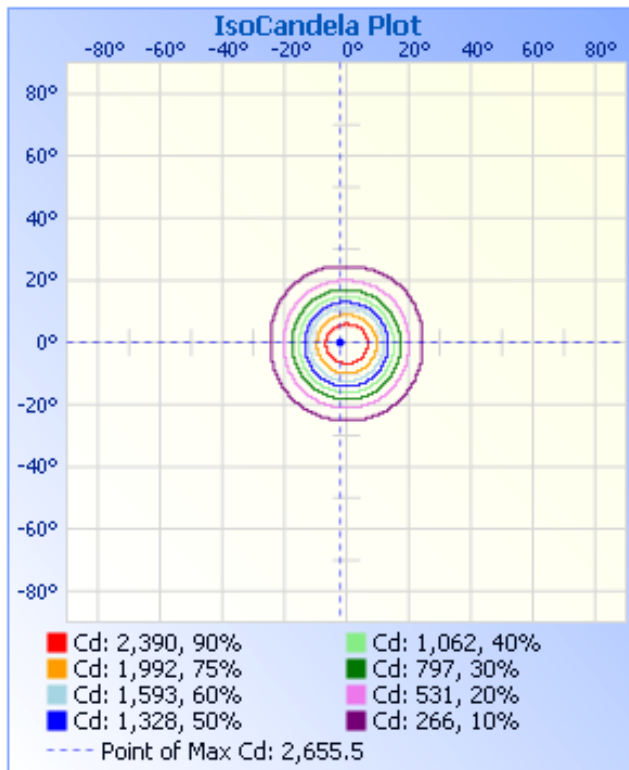
Field Angle



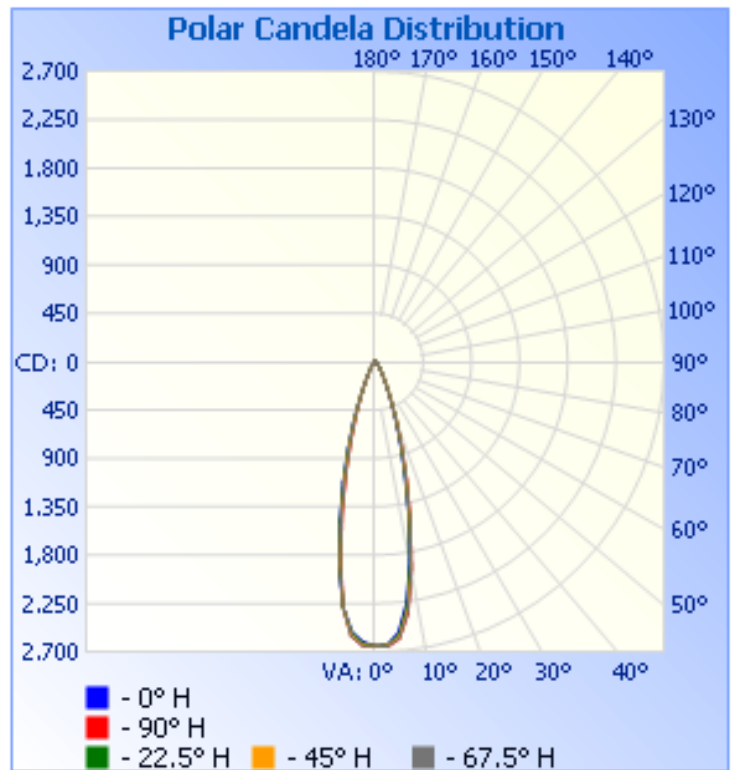
Illuminance Plot (Footcandles)

Test Results – Candela Plots

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



IsoCandela Plot



Polar Candela Distribution

Test Results – Candela Tabulation

The following table provides the tabulated Candela measurements:

	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	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645	2645
2.5	2634	2638	2642	2651	2656	2645	2628	2611	2607	2621	2636	2646	2647	2641	2639	2636	2632
5.0	2522	2546	2569	2582	2590	2575	2546	2525	2517	2528	2545	2564	2564	2562	2542	2521	2519
7.5	2258	2289	2321	2352	2360	2354	2335	2315	2297	2303	2301	2302	2299	2288	2276	2264	2256
10.0	1872	1893	1929	1955	1960	1977	1969	1957	1947	1924	1904	1885	1865	1862	1853	1853	1868
12.5	1443	1471	1492	1518	1529	1539	1541	1540	1524	1504	1471	1443	1418	1407	1410	1415	1434
15.0	1063	1089	1111	1130	1139	1155	1160	1159	1157	1129	1095	1058	1032	1022	1029	1037	1060
17.5	770	794	815	823	821	837	846	837	838	820	790	754	731	732	742	747	768
20.0	545	568	584	583	569	582	592	583	580	568	545	519	506	512	532	530	544
22.5	377	396	407	400	381	388	395	387	386	376	361	345	342	352	373	369	377
25.0	260	272	280	271	255	256	257	252	253	248	239	231	231	243	259	256	260
27.5	184	192	194	186	175	172	171	167	168	168	163	161	160	171	185	182	184
30.0	132	138	139	133	124	122	118	115	117	116	116	115	119	126	137	132	132
32.5	99	103	101	98	92	90	86	85	88	88	85	89	94	96	101	100	99
35.0	76	76	75	73	68	66	64	65	65	63	63	65	68	71	77	74	76
37.5	57	58	58	55	52	51	50	49	48	48	48	50	52	54	58	57	57
40.0	44	45	45	42	41	40	39	39	38	37	37	39	41	42	44	44	44
42.5	34	34	34	33	32	31	32	31	30	29	29	30	31	33	34	33	34
45.0	26	26	27	26	25	25	25	25	23	22	22	23	24	25	26	25	26
47.5	20	20	20	20	19	20	20	20	18	17	17	18	19	19	20	19	20
50.0	15	16	16	15	15	16	16	16	15	14	14	14	14	15	15	15	15
52.5	12	12	12	12	12	13	13	13	12	11	11	11	12	12	12	11	12
55.0	10	10	10	10	10	10	11	11	10	9	9	10	10	10	10	9	10
57.5	9	9	9	8	9	9	10	10	9	8	8	9	9	8	8	8	9
60.0	8	8	8	8	8	8	9	9	8	8	8	8	8	8	7	7	8
62.5	7	7	7	7	8	8	8	8	7	7	7	8	7	7	7	7	7
65.0	7	7	7	7	7	7	8	8	7	7	7	7	7	7	6	6	7
67.5	6	6	6	6	7	7	7	7	7	6	7	7	6	6	6	6	6
70.0	6	6	6	6	6	7	7	7	6	6	6	6	6	6	5	5	6
72.5	5	5	5	5	6	6	6	7	6	6	6	6	5	5	5	5	5
75.0	5	5	5	5	5	5	6	6	5	5	5	5	5	5	4	4	5
77.5	4	4	4	4	4	4	5	5	5	4	4	4	4	4	3	4	4
80.0	3	3	3	3	3	3	4	4	4	3	3	3	3	3	3	3	3
82.5	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2
85.0	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
87.5	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Photometric Testing Information

The sample was evaluated for photometric and electrical characteristics using an integrating sphere and a goniophotometer, each located in purpose-built, temperature and humidity-controlled, draft free environments.

The integrating sphere is a 65-inch diameter sphere manufactured by Labsphere (Model# LMS650) which exhibits a “ 4π geometry” configuration according to IES LM-79-08 and is applicable for all types of LED products (directional and non-directional light projections). Its spectroradiometer is an array-type detector manufactured and calibrated by Labsphere (Model# CDS600).

The integrating sphere uses self-absorption correction to eliminate errors due to mismatches between the standard reference lamp and the test samples being measured. The auxiliary lamp used to perform this task is a halogen type lamp powered by a calibrated *Lamp Power Supply* manufactured and calibrated by Labsphere (model LPS 200). Ambient temperature (for photometric analysis) is measured using a “J-Type” thermocouple located inside the integrating sphere at the same height as the sample under test and not more than 1 meter in horizontal distance away from the sample. The thermocouple is located behind the baffle of the photo detector in order to eliminate any direct optical radiation from the sample under test.

Luminaire Stabilization.

The sample was placed inside the integrating sphere and powered by a regulated and conditioned 120.0 Volt, alternating current supply. The correlated color temperature, color rendering index, chromaticity coordinates and electrical power measurements contained in this report are the numeric **averages** of the three readings upon which stabilization is verified. The stabilization times shown on the results pages of this report denote the time of the 1st measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization.

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

Manufacturer: Sylvania

Model# 75Q/CL-28V

Voltage = 28.0 Volt

Wattage = 75.0 Watts

Calibration Current = 2.679 Amperes

Luminous Flux = 1538.8 Lumens

Calibration Date = 8-18-2005 (calibrated by Labsphere – NIST traceable).

Continued.....

Photometric Testing Information (continued)

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

Manufacturer: General Electric
 Part Number: CSB-110
 Bulb Number: 108-A
 Voltage: 24.0 Volts
 Wattage: 150.0 Watts
 Calibration Current: 4.799 Amperes
 Luminous Intensity: 150.3 Candelas
 Calibration Date: 4-14-2009 (NIST traceable)

A *Power Analyzer* was used to measure all electrical characteristics of the sample.

Equipment List:

Description	Manufacturer and Model Number	OnSpeX Instrument Reference Number	Calibration Due Date
Integrating Sphere 65"	Labsphere LMS650	IS100	N/A
Spectroradiometer	Labsphere CDS600	CDS600	5-20-2011
Auxiliary Lamp PSU	Labsphere LPS200	LPS200	2-16-2011
Power Analyzer	Voltech PM1000+	PA110	4-27-2011
Power Analyzer	Yokogawa WT210	PA107	3-23-2011
Regulated Power Supply	California Instruments 1001P	AC100	N/A
Regulated Power Supply	Chroma Instruments 61602	AC300	N/A
Thermometer (Thermocouple)	Fluke 52	TH100	8-04-2011

All equipment is calibrated by TMI (Technical Maintenance, Inc.) ISO / IEC 17025-2005 Accredited (Cert. 1378.01) except: Labsphere CDS600 and Labsphere LPS200 which is calibrated by Labsphere, USA.