



PHOTOMETRIC TESTING & EVALUATION TO IES LM-79-08

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

Prepared for:

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Program Description

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

Executive Summary

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

Luminous Efficacy* (Lumens/Watt)	Luminous Flux* (Lumens)	Input Power* (Watts)	Power Factor*
51.85	708.3	13.66	0.924

CCT (K)*	CRI*	Stabilization Time (Light & Power)
2944.8	82.4	43 minutes

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



TABLE OF CONTENTS

Sample.....	4
Test Results.....	5
Spectral Flux.....	6
Chromaticity Diagram.....	7
Flux Distribution – Zonal Lumen Summary.....	8
Illuminance Plots.....	9
Candela Plots.....	10
Candela Tabulation.....	11
Photometric Testing Information.....	12
Equipment List:.....	13

Sample

The following sample was submitted for evaluation:

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



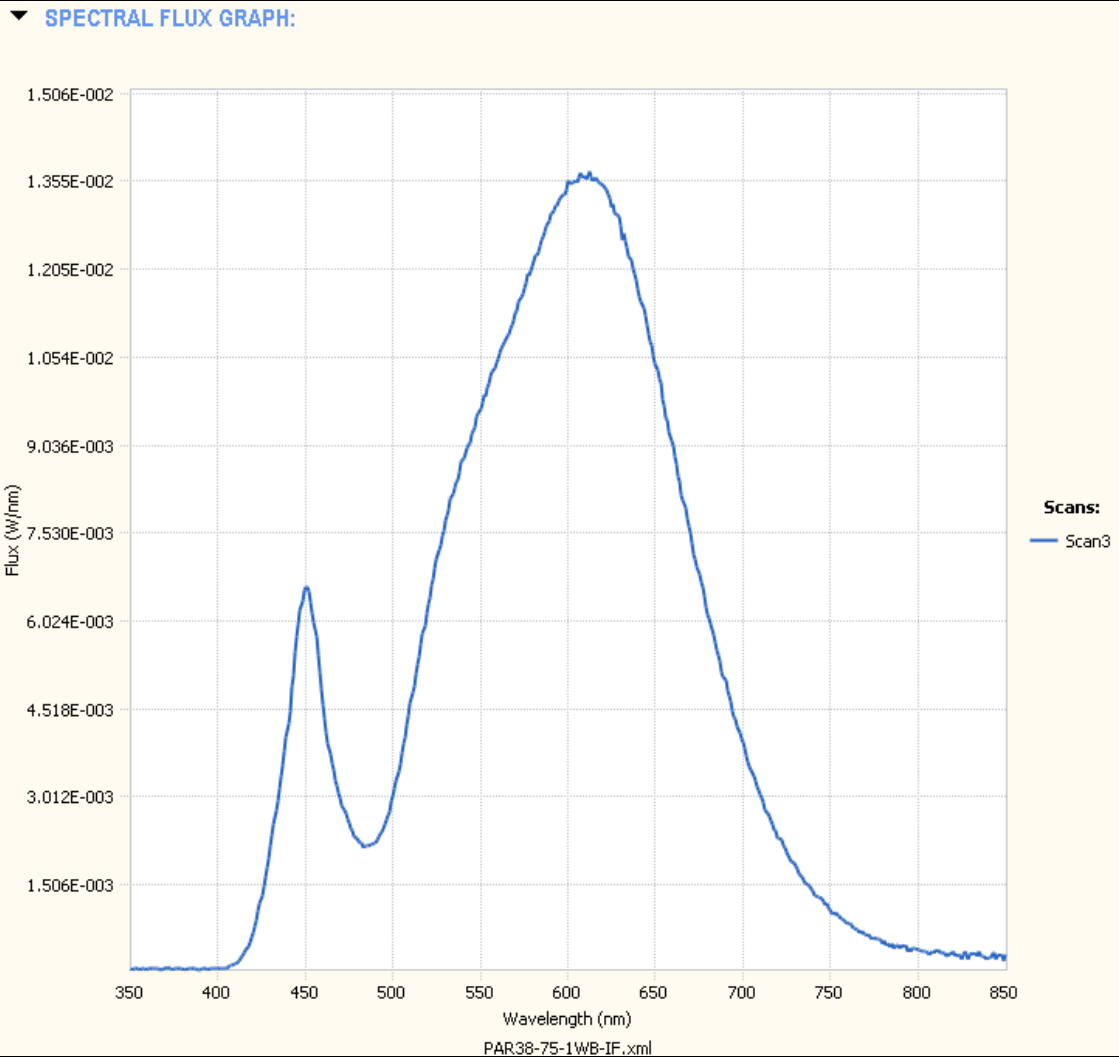
LED-PAR38-75-1WD-IF

October 18, 2010

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-IF	
	Integrating Sphere	Goniophotometer
Luminous Efficacy (Lumens/Watt)	51.82	50.96
Total Luminous Flux (Lumens)	708.3	693.1
Total Radiant Flux (Watts)	2.34	
Correlated Color Temperature (CCT)	2944.8	
Color Rendering Index (CRI)	82.4	
Chromaticity (Chroma x / Chroma y)	0.4403 / 0.4043	
Chromaticity (Chroma u / Chroma v)	0.2526 / 0.3480	
Chromaticity (Chroma u' / Chroma v')	0.2526 / 0.5220	
D _{uv} Value	-0.00033	
Stabilization Time (Light and Power)	Approx. 43 minutes	
Total Run Time – Integrating Sphere	49 minutes	
Total Run Time – Goniophotometer	97 minutes	
Spacing Criteria	0.52 (0° – 180°) / 0.56 (90° – 270°)	
Electrical Input Results:	Sample Reference	
	LED-PAR38-75-1WD-IF	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	13.66	13.60
Input Voltage (Volts AC)	120.0	120.0
Input Current (Amps)	0.123	0.125
Input Frequency (Hertz)	60.0	60.0
Power Factor	0.924	0.910
Additional Information	Sample Reference	
	LED-PAR38-75-1WD-IF	
Ambient Temperature	25.6°C	
Integrating Sphere Detector	CDS 600 Spectroradiometer	
Absorption Correction used?	Yes	

Spectral Flux

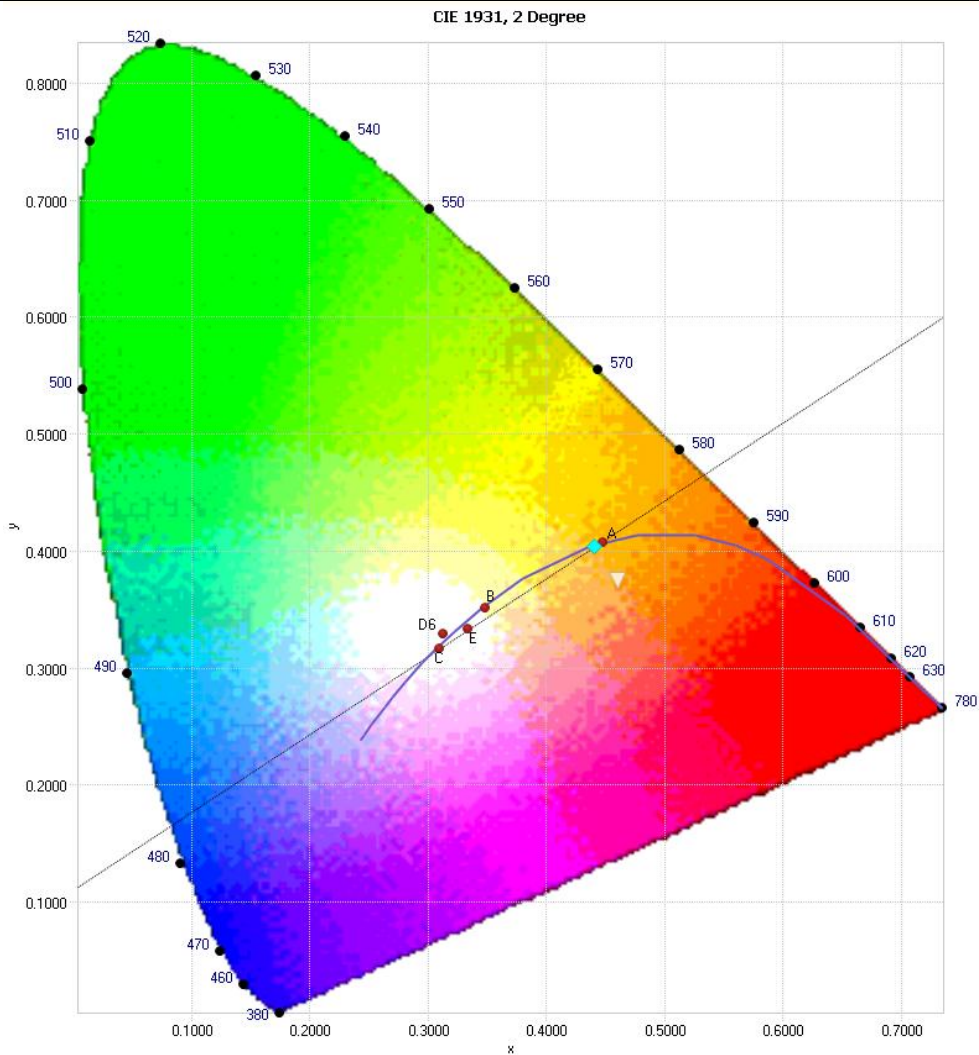
The following graph shows the spectral response curve of the radiant flux for the sample:



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 = 0.4403 / 0.4043

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:

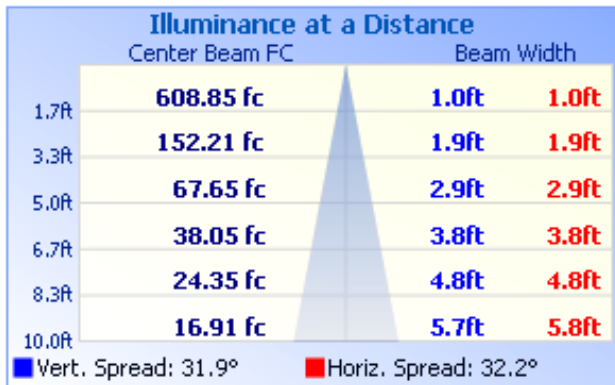
Zone	Lumens	% Total
0 - 10	142.2	20.5%
10 - 20	253.5	36.6%
20 - 30	162.3	23.4%
30 - 40	69.8	10.1%
40 - 50	28.9	4.2%
50 - 60	15.8	2.3%
60 - 70	12.2	1.8%
70 - 80	6.8	1.0%
80 - 90	1.6	0.2%
Total	693.1 Lumens	100%

Zonal Lumen Summary

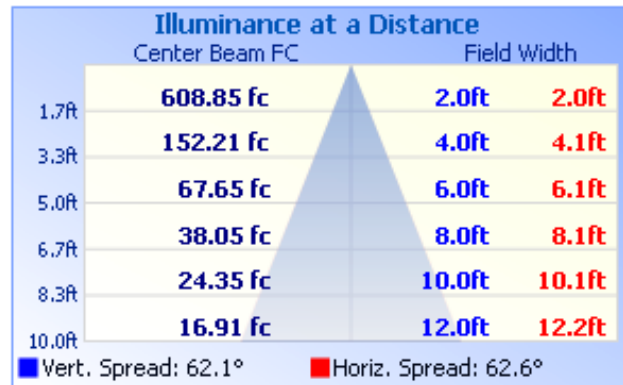
Zone	Lumens	% Lamp / Luminaire
0 - 60	672.5	97.0%
60 - 90	20.7	3.0%
0 - 90	693.1	100%
90 - 180	0.0	0.0%
0 - 180	693.1	100%

Test Results – Illuminance Plots

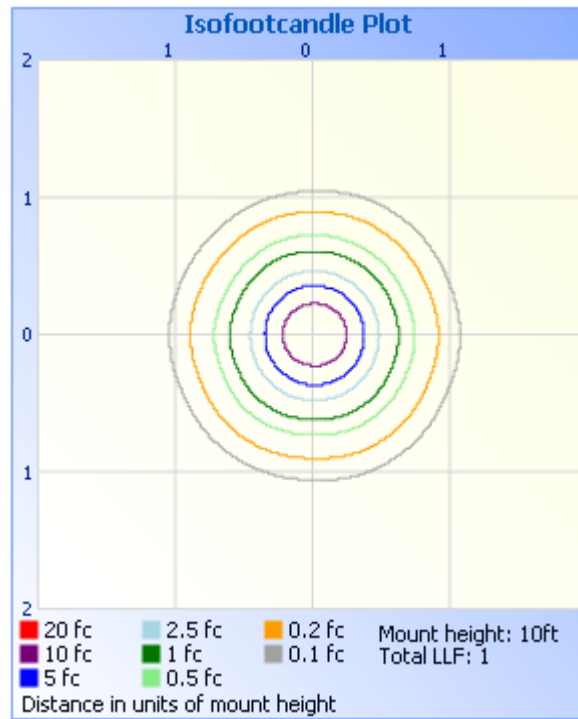
The following images depict the illuminance characteristics of the luminaire.



Beam Angle



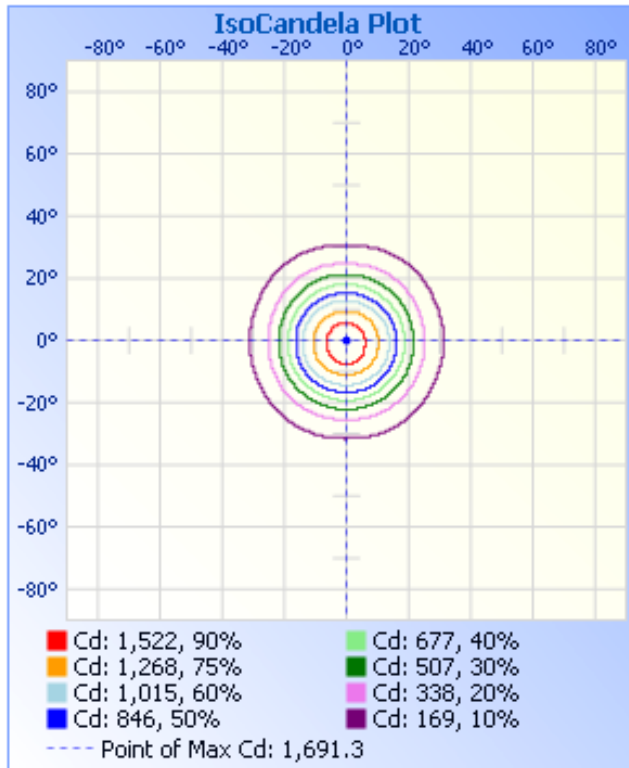
Field Angle



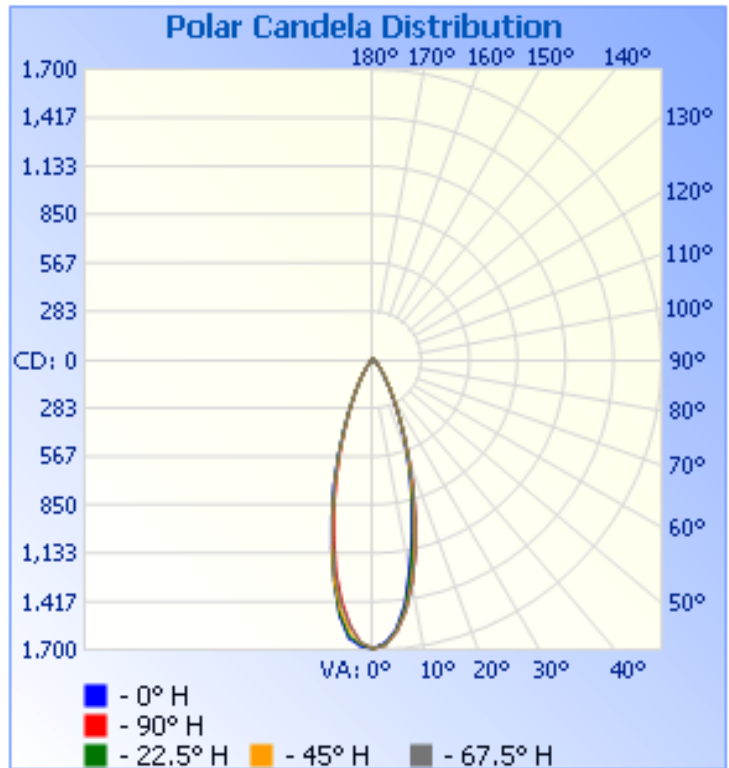
Illuminance Plot (Footcandles)

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	1691	1691	1691	1691	1691	1691	1691	1691	1691	1691	1691	1691	1691	1691	1691	1691	1691
2.5	1659	1666	1673	1676	1673	1677	1684	1686	1679	1671	1660	1657	1662	1667	1661	1656	1656
5.0	1580	1588	1595	1600	1600	1604	1625	1638	1639	1626	1594	1564	1560	1562	1563	1569	1579
7.5	1440	1458	1476	1482	1481	1499	1522	1524	1514	1504	1477	1441	1425	1420	1434	1437	1438
10.0	1239	1267	1315	1328	1326	1349	1362	1340	1320	1318	1316	1280	1261	1262	1270	1246	1236
12.5	1059	1082	1132	1154	1152	1184	1169	1145	1130	1116	1119	1100	1068	1082	1065	1047	1054
15.0	882	903	933	966	960	993	973	951	941	933	921	920	890	902	875	872	880
17.5	726	737	757	787	777	801	787	771	767	754	738	743	718	730	710	711	725
20.0	583	599	605	623	613	627	618	612	604	595	578	582	565	572	563	573	582
22.5	452	471	471	480	473	479	475	468	460	456	442	440	432	437	437	448	452
25.0	341	358	358	358	359	358	359	351	344	342	334	328	327	326	334	341	341
27.5	254	269	271	265	269	263	268	262	258	257	251	243	248	244	254	259	254
30.0	188	201	204	194	200	193	198	197	192	193	187	178	188	180	192	193	187
32.5	137	150	152	144	150	142	146	147	143	146	138	132	141	133	145	144	137
35.0	101	111	113	106	112	105	108	110	107	109	101	98	105	98	109	107	101
37.5	76	84	85	79	84	78	80	83	81	81	75	74	79	74	81	81	76
40.0	58	64	64	60	64	59	61	63	60	61	57	56	60	56	61	61	58
42.5	45	49	49	46	49	46	48	48	46	46	43	43	46	43	46	46	44
45.0	35	38	38	36	38	36	37	38	35	35	33	34	35	33	36	36	35
47.5	28	30	30	28	30	28	30	30	28	27	26	27	27	26	28	28	28
50.0	22	24	23	22	24	23	25	24	22	22	21	22	22	21	22	22	22
52.5	19	20	19	19	20	20	21	20	19	18	18	19	18	18	18	18	19
55.0	16	17	17	17	18	18	19	18	18	17	17	17	16	16	16	16	16
57.5	15	15	15	15	16	17	18	17	17	16	16	17	15	15	15	14	15
60.0	14	14	14	14	15	16	17	17	17	15	15	16	14	14	14	14	14
62.5	13	13	13	13	14	15	16	16	15	14	14	14	13	13	13	13	13
65.0	12	12	12	12	12	13	15	14	14	13	13	13	12	12	11	11	12
67.5	10	11	11	10	11	11	13	13	12	11	11	11	10	10	10	10	10
70.0	9	9	9	9	9	10	11	11	10	9	9	10	9	9	9	8	9
72.5	7	8	8	7	7	8	9	9	9	8	8	8	8	7	7	7	7
75.0	6	7	6	6	6	7	7	7	7	6	6	7	6	6	6	6	6
77.5	5	5	5	5	5	5	6	6	6	5	5	5	5	5	5	4	5
80.0	4	4	4	3	3	4	4	4	4	4	4	4	4	4	3	3	3
82.5	2	3	3	2	2	2	3	3	3	2	2	3	3	2	2	2	2
85.0	1	2	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1
87.5	0	1	1	0	0	0	1	1	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.