



PHOTOMETRIC TESTING & EVALUATION TO IES LM-79-08

Sample Tested
LED-PAR30L-50-1WD-INF

Prepared for:

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Program Description

Photometric and electrical testing of an “LED-PAR30L-50-1WD-INF” replacement lamp to IES LM-79-08.

Executive Summary

Sample Tested = **LED-PAR30L-50-1WD-INF**

Luminous Efficacy* (Lumens/Watt)	Luminous Flux* (Lumens)	Input Power* (Watts)	Power Factor*
61.38	488.2	7.954	0.897

CCT (K)*	CRI*	Stabilization Time (Light & Power)
2966.1	81.7	39 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-PAR30L-50-1WD-INF**



LED-PAR30L-50-1WD-INF

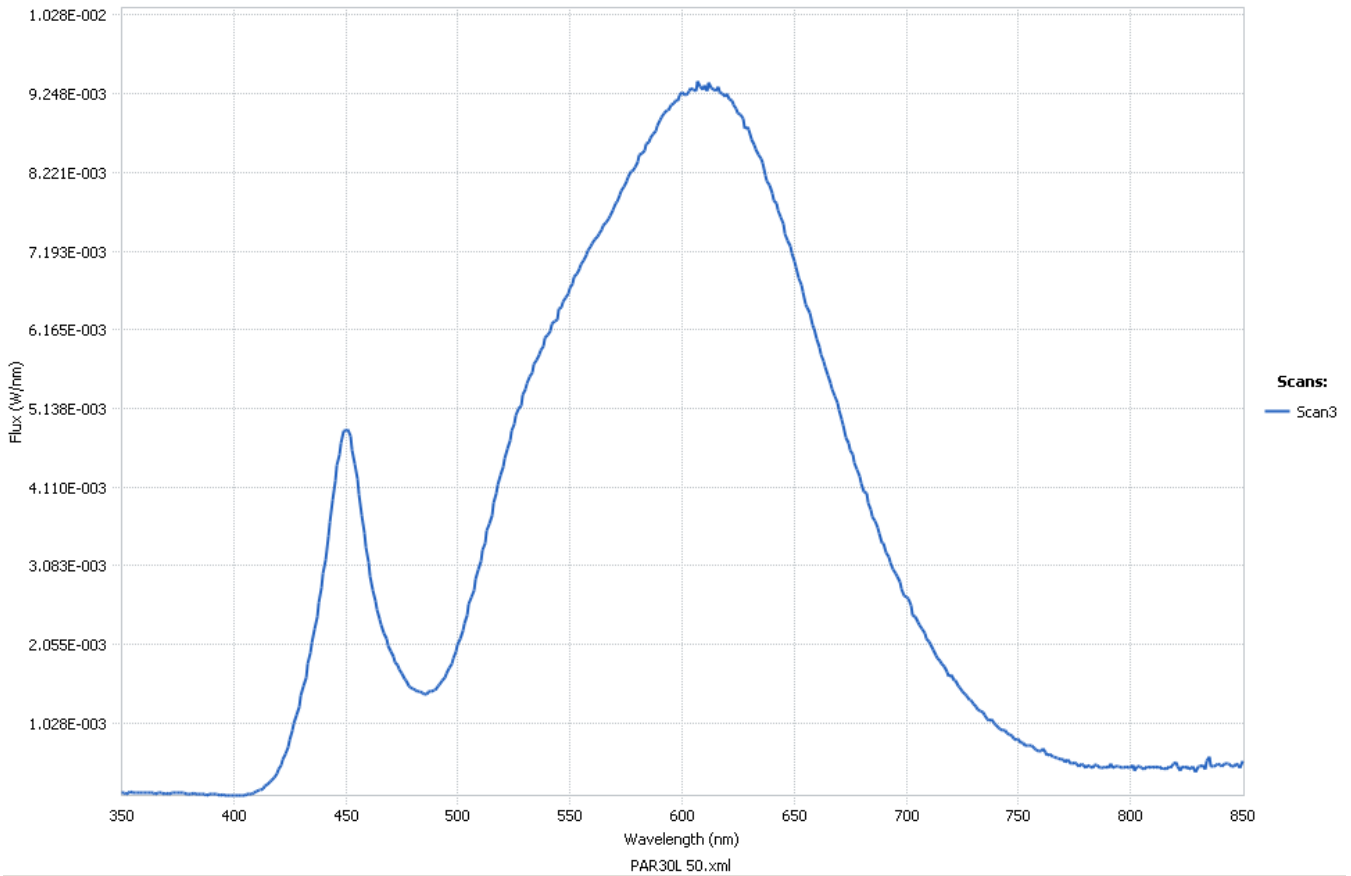
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Test Results –		
The following results were measured after stabilization of the sample in the Integrating Sphere (unless otherwise stated). Stability is reached when the variation of 3 readings of light output and electrical power, taken 15 minutes apart, is less than 0.50% (in accordance with IES LM-79-08).		
Key Photometric Results	Sample Reference	
	LED-PAR30L-50-1WD-INF	
	Integrating Sphere	Goniophotometer
Luminous Efficacy (Lumens/Watt)	61.38	59.29
Total Luminous Flux (Lumens)	488.2	474.3
Total Radiant Flux (Watts)	1.63	
Correlated Color Temperature (CCT)	2966.1	
Color Rendering Index (CRI)	81.7	
Chromaticity (Chroma x / Chroma y)	0.4392 / 0.4047	
Chromaticity (Chroma u / Chroma v)	0.2517 / 0.3480	
Chromaticity (Chroma u' / Chroma v')	0.2517 / 0.5220	
D _{uv} Value	0.0002	
Stabilization Time (Light and Power)	Approx. 39 minutes	
Total Run Time – Integrating Sphere	46 minutes	
Total Run Time – Goniophotometer	94 minutes	
Spacing Criteria	0.48 (0° – 180°) / 0.48 (90° – 270°)	
Electrical Input Results:	Sample Reference	
	LED-PAR30L-50-1WD-INF	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	7.954	8.000
Input Voltage (Volts AC)	120.0	120.0
Input Current (Amps)	0.073	0.075
Input Frequency (Hertz)	60.0	60.0
Power Factor	0.897	0.887
Additional Information	Sample Reference	
	LED-PAR30L-50-1WD-INF	
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:

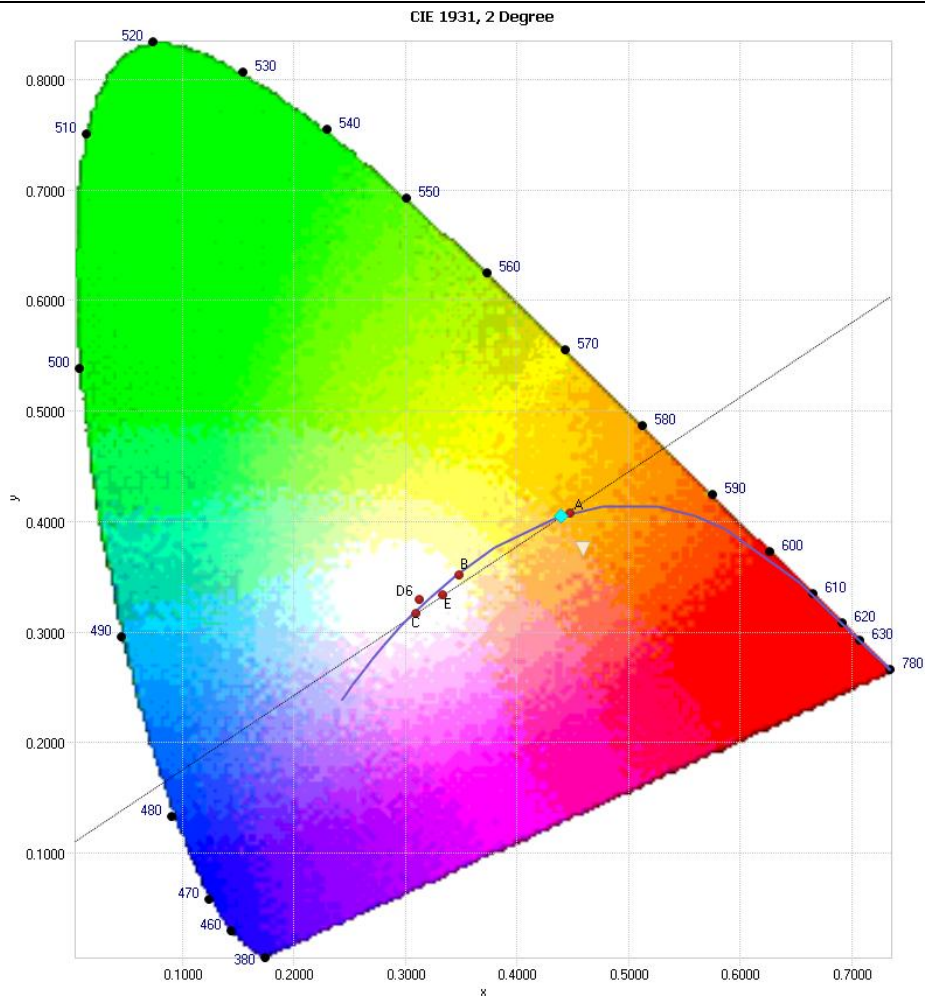
▼ SPECTRAL FLUX GRAPH:



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):
 $x / y = 0.4392 / 0.4047$

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:

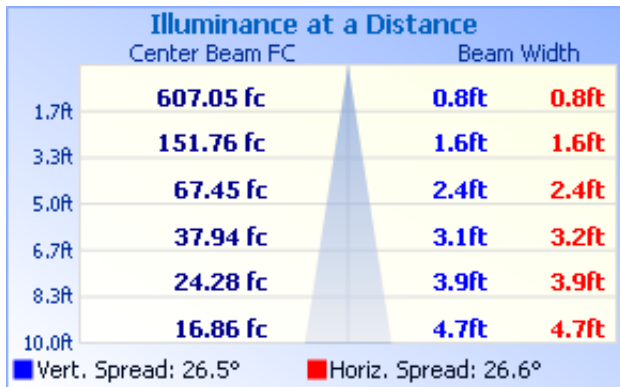
Zone	Lumens	% Total
0 - 10	140.5	29.60%
10 - 20	193.8	40.90%
20 - 30	82.3	17.30%
30 - 40	29.6	6.20%
40 - 50	12.8	2.70%
50 - 60	6.1	1.30%
60 - 70	4.5	1.00%
70 - 80	3.5	0.70%
80 - 90	1.1	0.20%
Total	474.3 Lumens	100%

Zonal Lumen Summary

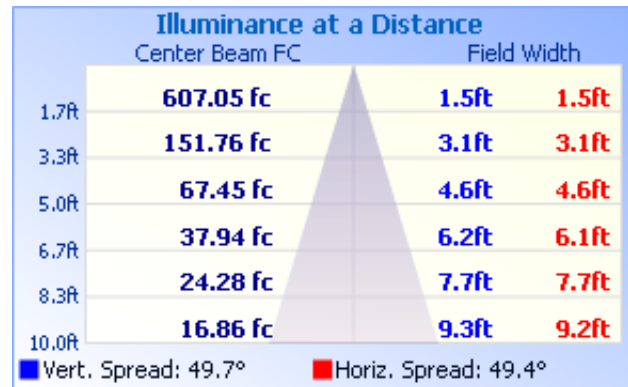
Zone	Lumens	% Lamp / Luminaire
0 - 60	465.1	98.1 %
60 - 90	9.2	1.9 %
0 - 90	474.3	100 %
90 - 180	0.0	0.0 %
0 - 180	474.3	100 %

Test Results – Illuminance Plots

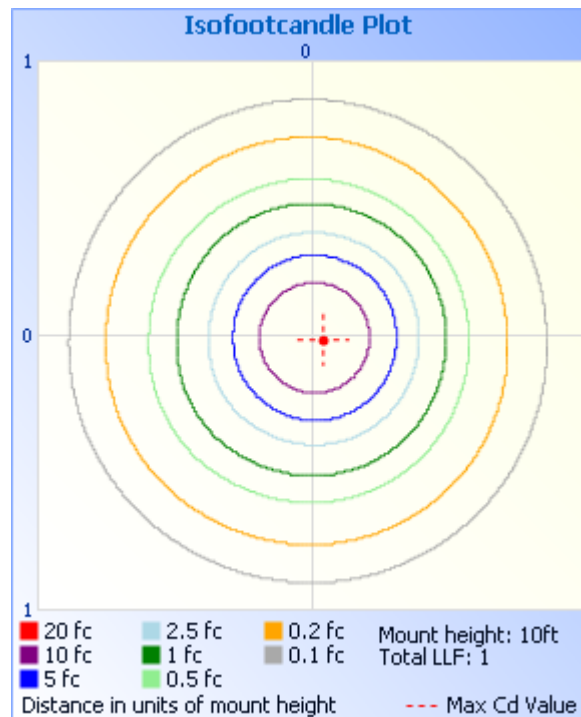
The following images depict the illuminance characteristics of the luminaire.



Beam Angle



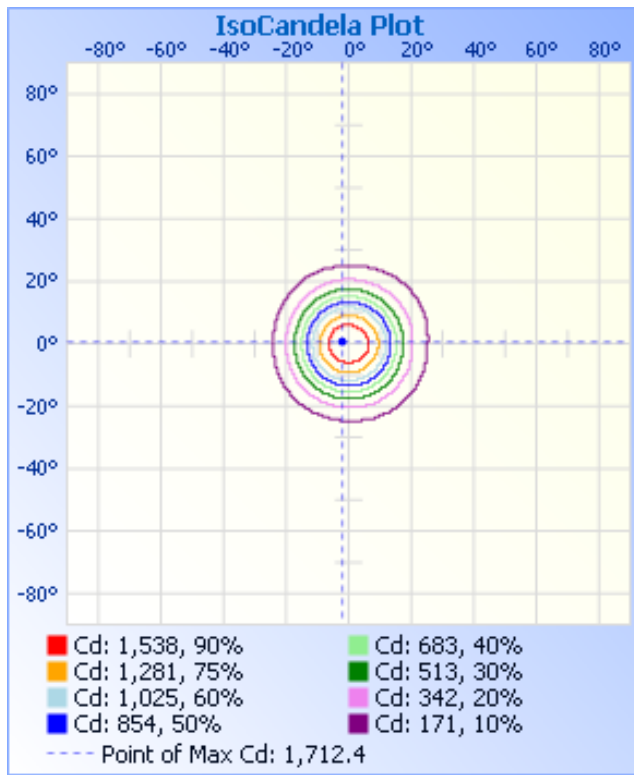
Field Angle



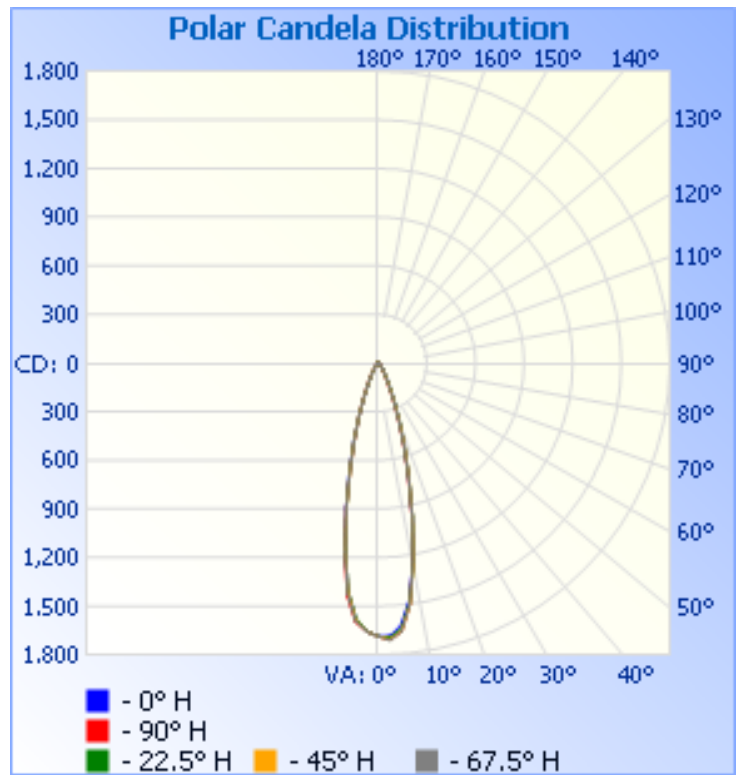
Illuminance Plot (Footcandles)

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	1686	1686	1686	1686	1686	1686	1686	1686	1686	1686	1686	1686	1686	1686	1686	1686	1686
2.5	1684	1693	1704	1712	1707	1694	1680	1667	1657	1656	1658	1657	1656	1660	1667	1675	1683
5.0	1623	1645	1661	1662	1660	1642	1620	1598	1585	1582	1591	1599	1604	1606	1605	1609	1622
7.5	1475	1490	1500	1499	1496	1480	1461	1437	1422	1421	1424	1440	1451	1456	1457	1460	1473
10.0	1238	1247	1252	1243	1235	1225	1208	1190	1177	1172	1173	1178	1192	1210	1214	1225	1236
12.5	970	974	975	969	956	945	936	923	912	905	900	902	911	921	937	951	964
15.0	725	731	732	725	711	711	701	689	685	675	665	662	666	676	693	707	724
17.5	534	539	537	527	515	516	511	494	495	490	485	481	479	493	506	517	533
20.0	384	386	379	364	356	357	353	339	340	343	343	344	342	362	371	371	383
22.5	266	265	257	242	235	236	233	226	228	233	236	238	240	261	267	263	266
25.0	182	180	172	160	153	152	151	149	153	157	161	163	168	184	189	184	182
27.5	128	125	118	108	101	100	99	101	106	109	112	114	120	129	133	128	128
30.0	91	88	82	76	69	67	68	70	77	78	82	86	88	94	96	92	91
32.5	69	64	60	55	50	49	49	53	56	58	60	64	66	71	73	68	69
35.0	52	48	45	41	37	37	36	39	42	43	45	47	49	53	53	52	51
37.5	38	36	34	31	29	29	28	30	32	33	34	36	38	40	40	39	38
40.0	29	28	27	25	23	23	23	24	25	26	26	28	29	30	31	30	29
42.5	23	22	21	20	19	19	18	19	20	20	20	21	22	23	23	23	23
45.0	18	17	16	16	15	15	15	15	15	15	15	16	16	17	17	17	17
47.5	13	13	13	12	12	12	12	12	12	12	12	12	12	13	13	13	13
50.0	10	10	10	10	10	10	10	10	9	9	9	9	9	10	10	10	10
52.5	8	8	8	8	8	8	8	8	8	7	7	7	7	8	8	8	8
55.0	6	7	6	6	7	7	7	7	6	6	6	6	6	6	6	6	6
57.5	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	5	6
60.0	5	5	5	5	5	6	6	6	5	5	5	5	5	5	5	5	5
62.5	5	5	5	5	5	5	6	5	5	5	5	5	4	4	4	4	5
65.0	4	4	4	5	5	5	5	5	5	5	4	4	4	4	4	4	4
67.5	4	4	4	4	5	5	5	5	4	4	4	4	4	4	4	4	4
70.0	4	4	4	4	4	5	5	4	4	4	4	4	4	4	4	4	4
72.5	4	4	4	4	4	4	5	4	4	4	4	4	3	3	3	3	4
75.0	3	3	3	4	4	4	4	4	4	4	3	3	3	3	3	3	3
77.5	3	3	3	3	3	3	4	3	3	3	3	3	2	2	2	2	3
80.0	2	2	2	3	3	3	3	3	3	2	2	2	2	2	2	2	2
82.5	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2
85.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
87.5	0	0	0	1	0	0	0	1	1	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

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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.