



PHOTOMETRIC TESTING & EVALUATION TO IES LM-79-08

Sample Tested
(Girasole Inground White 3200K LED Luminaire)
GSLEDINTWT32NBD120/277VRAW

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Technical Report Number
30014386-5

July 12, 2010

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Program Description

Photometric and electrical testing of a “Beghelli Girasole Inground” LED luminaire to IES LM-79-08.

Executive Summary

Sample Tested = **GSLEDINTWT32NBD120/277VRAW**

Luminous Efficacy* (Lumens/Watt)	Luminous Flux* (Lumens)	Input Power* (Watts)	Power Factor*
25.07	677.3	27.02	0.995

CCT (K)*	CRI*	Stabilization Time (Light & Power)
3076.6	80.8	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:

Beghelli: GSLEDINTWT32NBD120/277VRAW



GSLEDINTWT32NBD120/277VRAW

Test Overview

The LED sample was evaluated in accordance with IES LM-79-08.

A *Goniophotometer* and an *Integrating Sphere* were used to measure all photometric characteristics of the sample. A full description of these and the associated equipment is provided at the end of this report.

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

The sample was evaluated for the following photometric properties:

- Luminous Flux
- Correlated Color Temperature (CCT)
- Color Rendering Index (CRI)
- Chromaticity Coordinates
- Luminous Efficacy
- Beam Distribution Properties

The sample was evaluated for the following electrical properties:

- Input Power (including Voltage, Current, Frequency and Power Factor)
- Total Harmonic Distortion of the input voltage (THD)

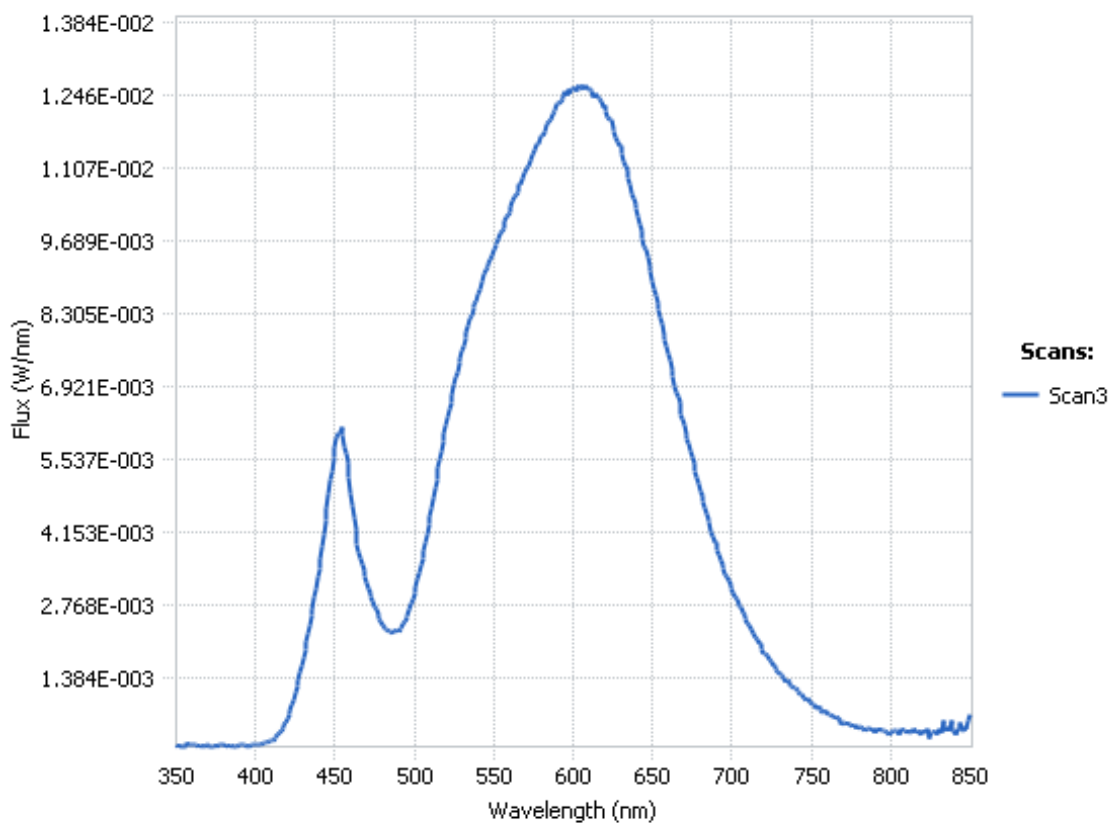
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Test Results –		
The following results were measured after stabilization of the sample in the Integrating Sphere (unless otherwise stated). Stability is reached when the variation of 3 readings of light output and electrical power, taken 15 minutes apart, is less than 0.50% (in accordance with IES LM-79-08).		
Key Photometric Results	Sample Reference	
	GSLEDINTWT32NBD120/277VRAW	
	Integrating Sphere	Goniophotometer
Luminous Efficacy (Lumens/Watt)	25.07	25.10
Total Luminous Flux (Lumens)	677.3	675.1
Total Radiant Flux (Watts)	2.152	
Correlated Color Temperature (CCT)	3076.6	
Color Rendering Index (CRI)	80.8	
Chromaticity (Chroma x / Chroma y)	0.4354 / 0.4106	
Chromaticity (Chroma u / Chroma v)	0.2468 / 0.3491	
Chromaticity (Chroma u' / Chroma v')	0.2468 / 0.5237	
Duv Value	0.00282	
Stabilization Time (Light and Power)	Approx. 45 minutes	
Total Run Time – Integrating Sphere	55 minutes	
Total Run Time – Goniophotometer	110 minutes	
Spacing Criteria	NA (0° – 180°) / NA (90° – 270°)	
Electrical Input Results:	Sample Reference	
	GSLEDINTWT32NBD120/277VRAW	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	27.02	26.9
Input Voltage (Volts AC)	120.0	120.0
Input Current (Amps)	0.226	0.227
Input Frequency (Hertz)	60.0	60.0
Power Factor	0.995	0.986
Total Harmonic Distortion (THD-V)	0.274%	
Additional Information	Sample Reference	
	GSLEDINTWT32NBD120/277VRAW	
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 FLUX GRAPH:

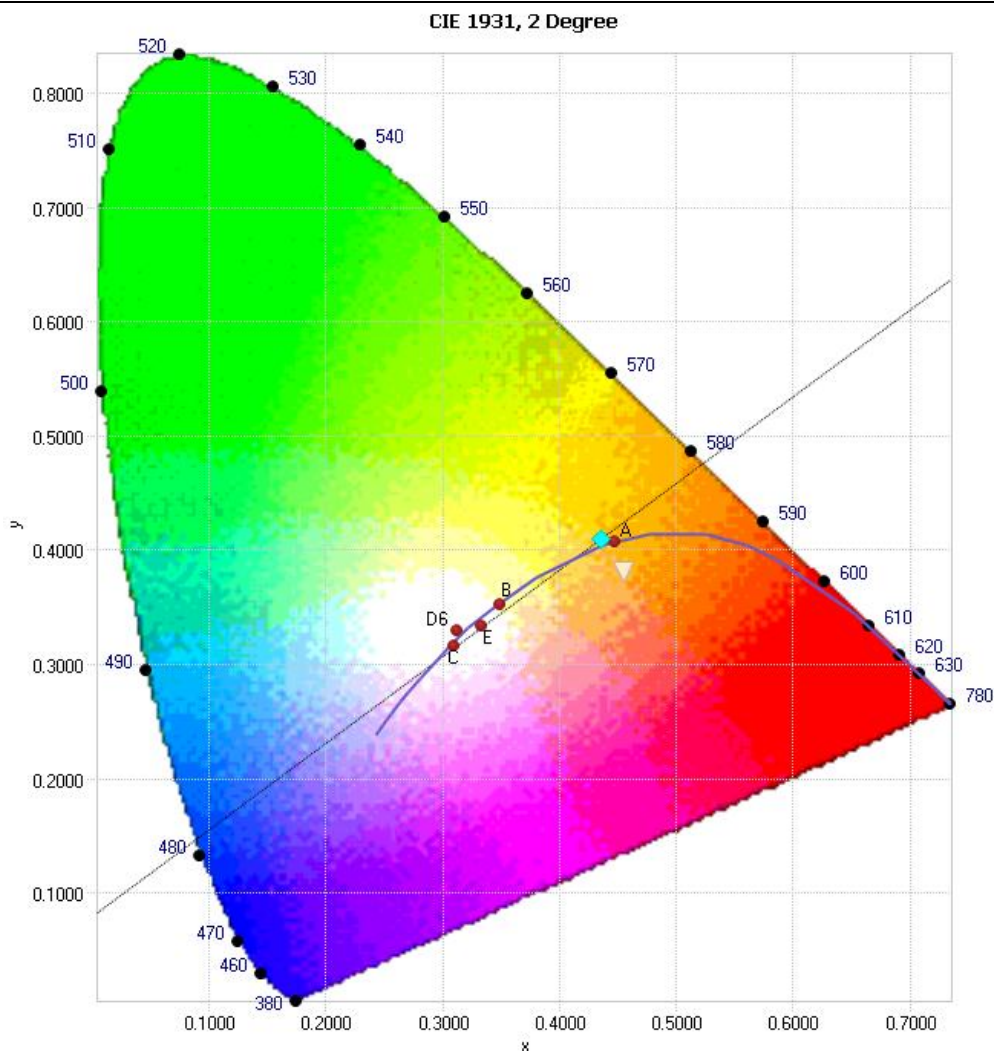


117100450 Girasole Inground 3200K.xml

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 7):
 $x / y = 0.4354 / 0.4106$

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

Test Results – Flux Distribution

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

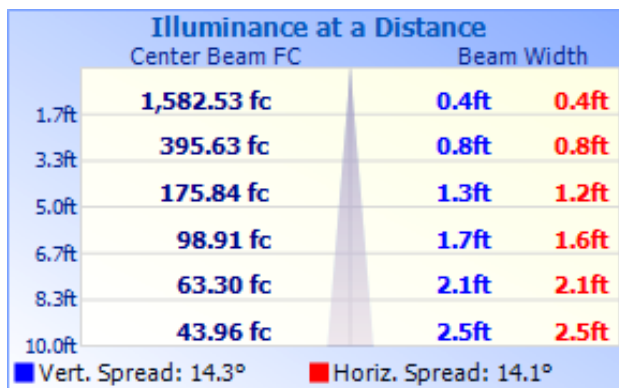
Zone	Lumens	% Total
0 - 10	232.2	34.4%
10 - 20	240.2	35.6%
20 - 30	120.7	17.9%
30 - 40	37.7	5.6%
40 - 50	24.3	3.6%
50 - 60	12.3	1.8%
60 - 70	4.8	0.7%
70 - 80	2.1	0.3%
80 - 90	0.9	0.1%
Total	675.1 Lumens	100%

Zonal Lumen Summary

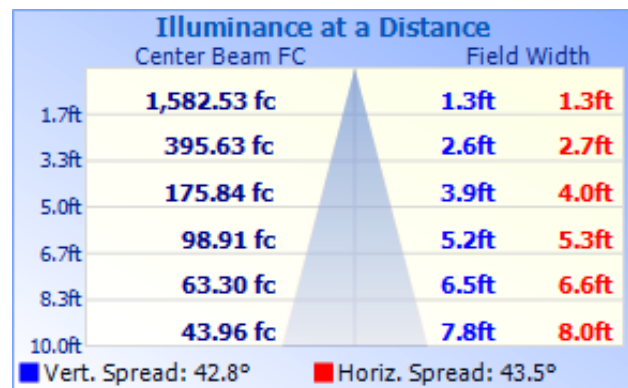
Zone	Lumens	% Lamp / Luminaire
0 - 60	667.3	98.8 %
60 - 90	7.8	1.2 %
0 - 90	675.1	100 %
90 - 180	0.0	0.0 %
0 - 180	675.1	100 %

Test Results – Illuminance Plots

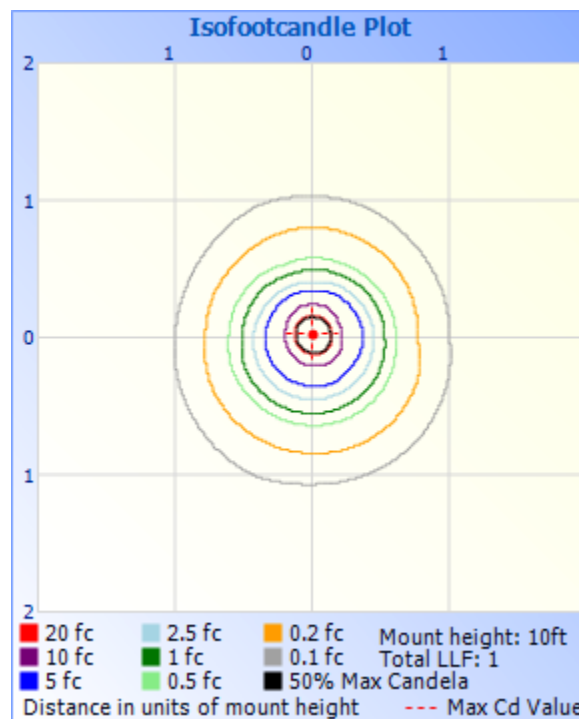
The following images depict the illuminance characteristics of the luminaire.



Beam Angle



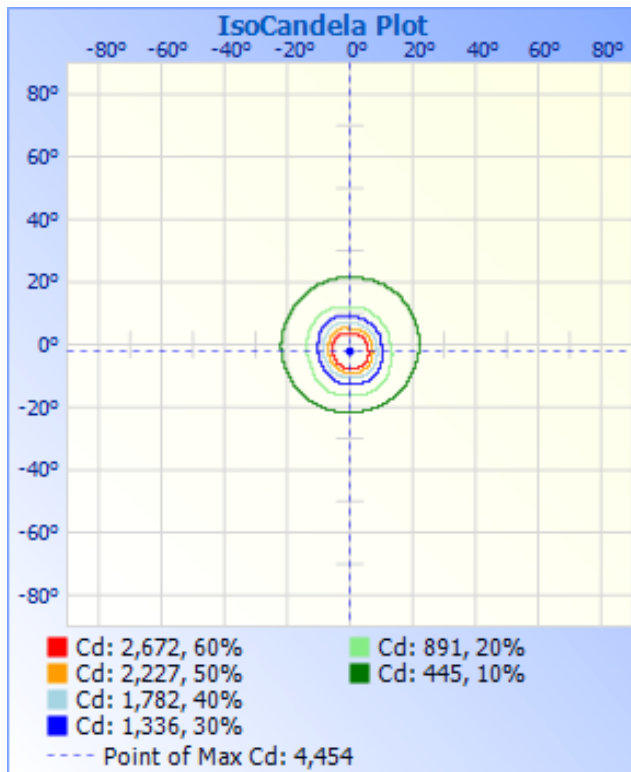
Field Angle



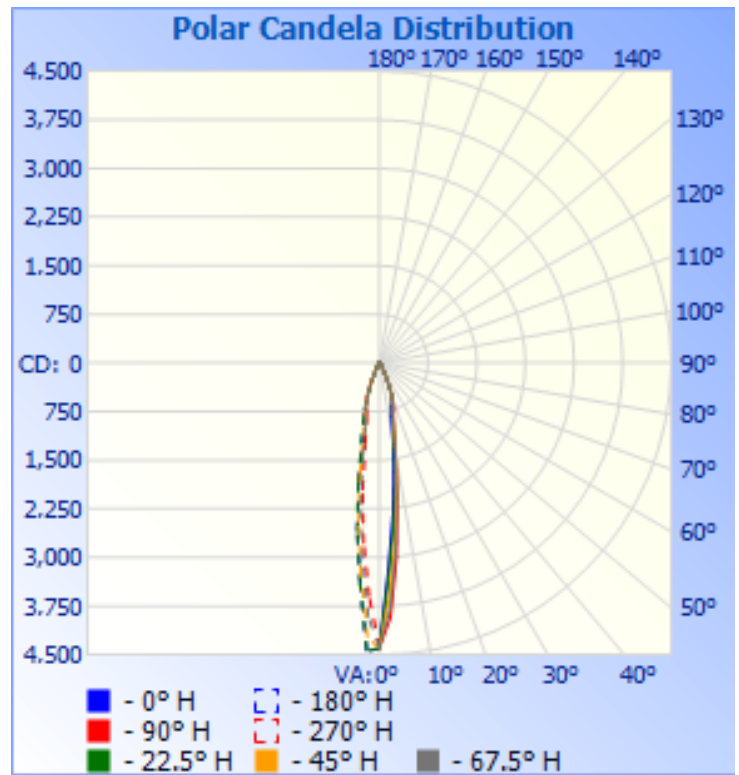
Illuminance Plot (Footcandles)

Test Results – Candela Plots

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



IsoCandela Plot



Polar Candela Distribution

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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	4396	4396	4396	4396	4396	4396	4396	4396	4396	4396	4396	4396	4396	4396	4396	4396	4396
2.5	3180	3294	3572	3780	3925	4098	4310	4434	4454	4439	4241	3925	3609	3414	3274	3197	3177
5.0	2361	2499	2746	2892	3009	3152	3317	3441	3423	3424	3286	3034	2795	2653	2543	2412	2360
7.5	1694	1858	2028	2087	2105	2244	2458	2615	2615	2634	2488	2206	1985	1867	1780	1730	1693
10.0	1189	1320	1431	1427	1414	1497	1657	1849	1860	1888	1735	1456	1274	1211	1168	1202	1190
12.5	850	938	1008	1011	1009	1015	1134	1268	1268	1276	1162	1000	902	859	837	855	849
15.0	702	756	792	807	826	812	898	986	956	982	894	800	766	718	715	716	702
17.5	646	680	677	694	737	711	764	790	757	777	728	696	700	656	655	647	646
20.0	553	578	552	566	612	596	587	575	534	550	540	538	569	553	562	558	553
22.5	400	409	403	403	426	396	377	358	312	327	342	355	395	398	416	410	400
25.0	267	262	274	269	250	247	219	200	184	183	211	220	242	261	271	271	267
27.5	175	166	171	163	146	147	138	120	116	109	136	138	137	168	174	175	175
30.0	116	113	112	104	93	94	86	81	81	77	95	98	99	114	112	113	116
32.5	82	82	80	75	65	65	65	64	66	62	64	71	72	81	78	78	82
35.0	63	65	63	60	49	52	52	52	54	53	52	56	54	61	61	62	63
37.5	52	52	53	49	39	42	44	45	46	45	43	44	43	48	50	51	52
40.0	44	45	45	42	34	36	39	40	41	40	38	38	37	41	43	43	44
42.5	40	40	40	37	31	32	35	36	37	36	33	31	33	36	39	39	40
45.0	36	33	34	32	28	29	29	31	32	32	29	28	29	33	33	35	36
47.5	29	30	30	27	24	24	26	27	27	29	26	23	25	26	30	32	29
50.0	24	28	28	22	19	19	22	25	24	25	22	19	20	22	26	27	24
52.5	18	20	20	16	14	16	17	18	17	18	16	15	17	17	19	20	18
55.0	13	13	13	12	12	12	13	12	12	13	12	11	13	13	14	14	13
57.5	10	10	10	9	10	9	10	9	9	9	9	9	10	10	10	10	10
60.0	8	8	8	7	8	7	7	7	8	7	7	7	8	8	8	8	8
62.5	7	6	6	6	6	5	5	5	6	6	5	5	6	6	6	6	7
65.0	5	5	4	4	6	4	4	4	5	5	4	4	5	5	5	4	5
67.5	4	4	3	3	5	3	3	3	4	4	3	3	4	4	4	4	4
70.0	3	3	3	3	4	2	2	3	3	3	2	2	4	3	3	3	3
72.5	3	2	2	2	4	2	2	2	3	3	2	2	3	2	2	2	3
75.0	2	2	1	2	3	1	1	2	3	2	1	1	2	2	2	2	2
77.5	2	2	1	1	3	1	1	1	2	2	1	1	2	2	1	1	2
80.0	2	1	1	1	3	1	1	1	2	2	1	1	2	1	1	1	2
82.5	2	1	1	1	3	1	1	1	2	1	1	1	2	1	1	1	2
85.0	2	1	1	1	2	1	1	1	2	1	1	1	1	1	1	1	2
87.5	1	1	0	0	1	0	0	0	1	0	0	0	0	1	1	1	1
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, 60 Hertz 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)

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	PA109	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	8-04-2010

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.