



PHOTOMETRIC TESTING & EVALUATION TO IES LM-79-08

Sample Tested
LED-PAR30S-50-1WD-INF

Prepared for:

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Program Description

Photometric and electrical testing of an “LED-PAR30S-50-1WD-INF” replacement lamp to IES LM-79-08.

Executive Summary

Sample Tested = **LED-PAR30S-50-1WD-INF**

Luminous Efficacy* (Lumens/Watt)	Luminous Flux* (Lumens)	Input Power* (Watts)	Power Factor*
59.85	472.6	7.896	0.896

CCT (K)*	CRI*	Stabilization Time (Light & Power)
2945.6	82.7	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-PAR30S-50-1WD-INF**



LED-PAR30S-50-1WD-INF

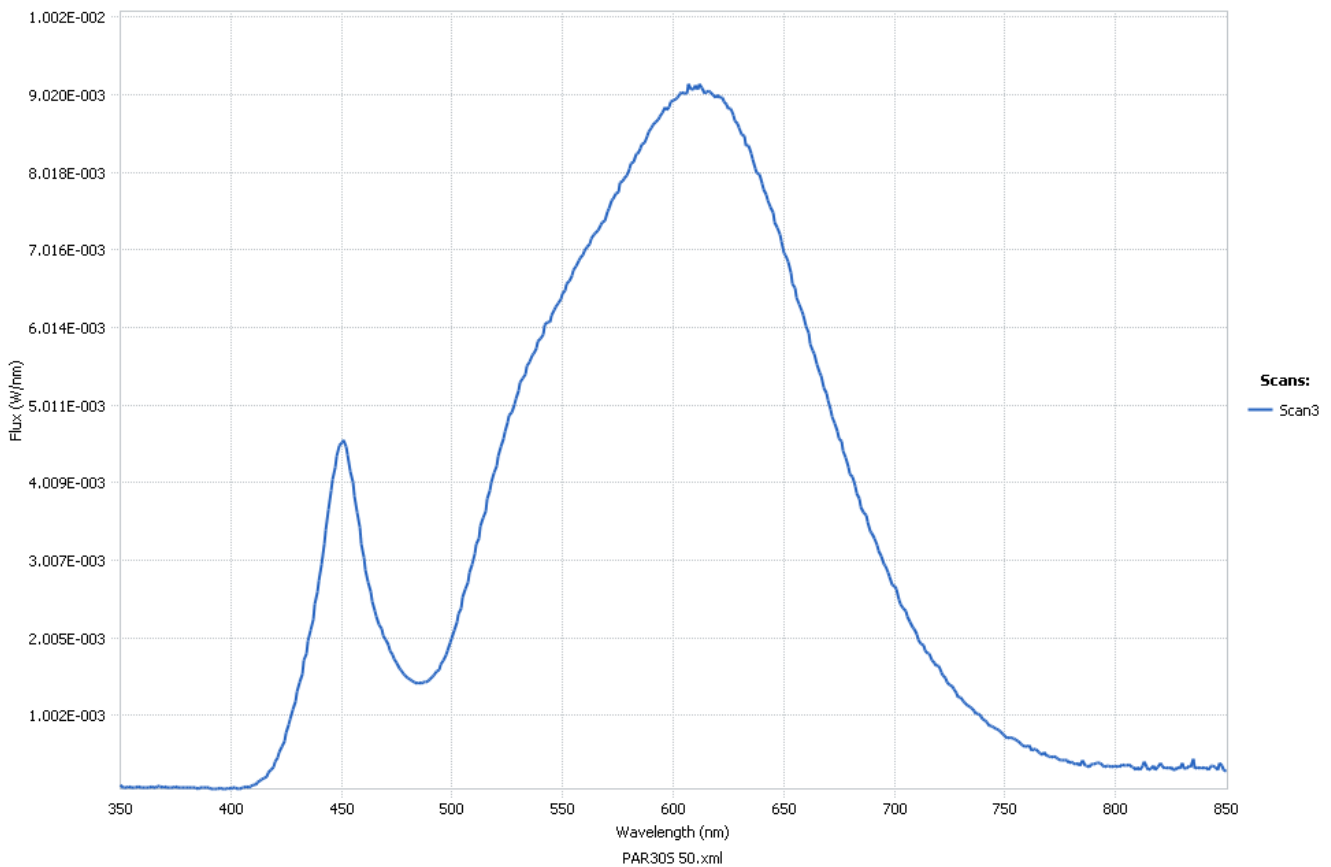
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Test Results –		
The following results were measured after stabilization of the sample in the Integrating Sphere (unless otherwise stated). Stability is reached when the variation of 3 readings of light output and electrical power, taken 15 minutes apart, is less than 0.50% (in accordance with IES LM-79-08).		
Key Photometric Results	Sample Reference	
	LED-PAR30S-50-1WD-INF	
	Integrating Sphere	Goniophotometer
Luminous Efficacy (Lumens/Watt)	59.85	58.08
Total Luminous Flux (Lumens)	472.6	458.8
Total Radiant Flux (Watts)	1.58	
Correlated Color Temperature (CCT)	2945.6	
Color Rendering Index (CRI)	82.7	
Chromaticity (Chroma x / Chroma y)	0.4406 / 0.4051	
Chromaticity (Chroma u / Chroma v)	0.2525 / 0.3482	
Chromaticity (Chroma u' / Chroma v')	0.2525 / 0.5223	
D _{uv} Value	0.0003	
Stabilization Time (Light and Power)	Approx. 39 minutes	
Total Run Time – Integrating Sphere	45 minutes	
Total Run Time – Goniophotometer	90 minutes	
Spacing Criteria	0.48 (0° – 180°) / 0.46 (90° – 270°)	
Electrical Input Results:	Sample Reference	
	LED-PAR30S-50-1WD-INF	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	7.896	7.900
Input Voltage (Volts AC)	120.0	120.0
Input Current (Amps)	0.073	0.074
Input Frequency (Hertz)	60.0	60.0
Power Factor	0.896	0.889
Additional Information	Sample Reference	
	LED-PAR30S-50-1WD-INF	
Ambient Temperature	25.2°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:

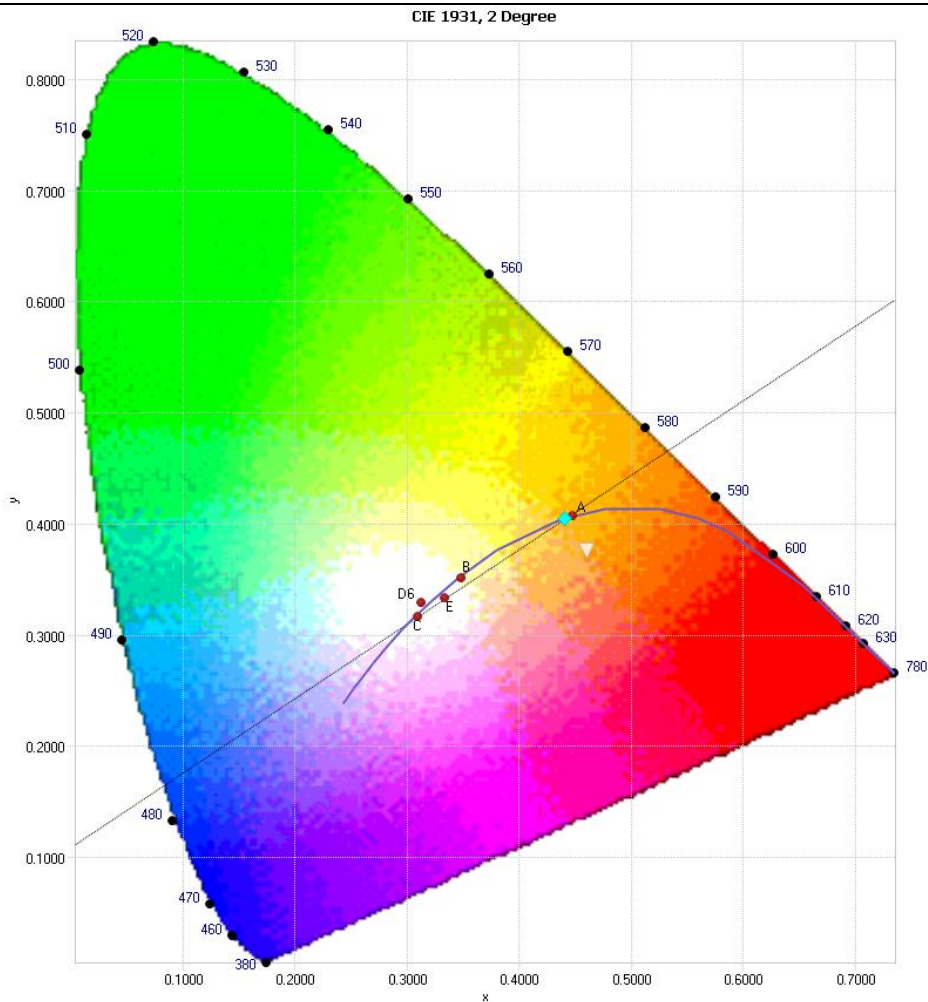
▼ SPECTRAL FLUX GRAPH:



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 = 0.4406 / 0.4051

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:

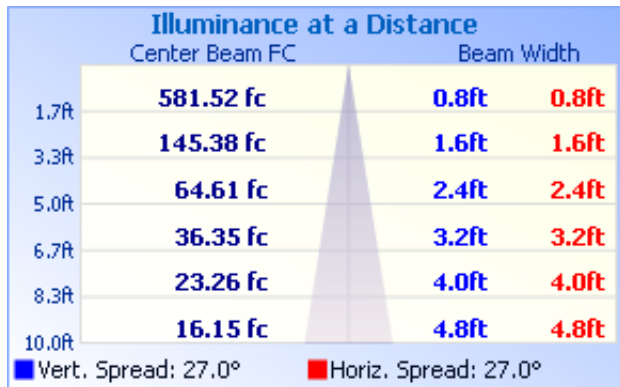
Zone	Lumens	% Total
0 - 10	134.9	29.40%
10 - 20	187.9	41.00%
20 - 30	79.2	17.30%
30 - 40	29	6.30%
40 - 50	12.7	2.80%
50 - 60	6.1	1.30%
60 - 70	4.5	1.00%
70 - 80	3.4	0.70%
80 - 90	1.1	0.20%
Total	458.8 Lumens	100%

Zonal Lumen Summary

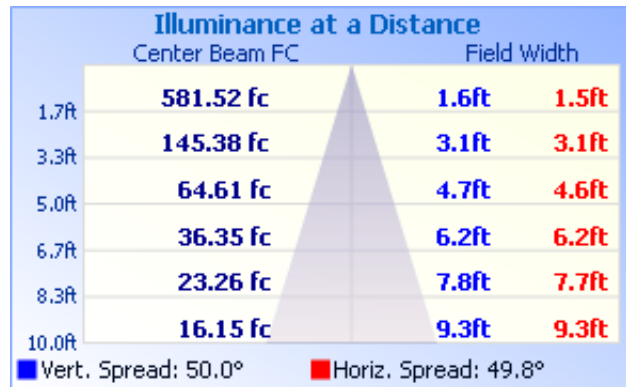
Zone	Lumens	% Lamp / Luminaire
0 - 60	449.8	98.0 %
60 - 90	9.0	2.0 %
0 - 90	458.8	100 %
90 - 180	0.0	0.0 %
0 - 180	458.8	100 %

Test Results – Illuminance Plots

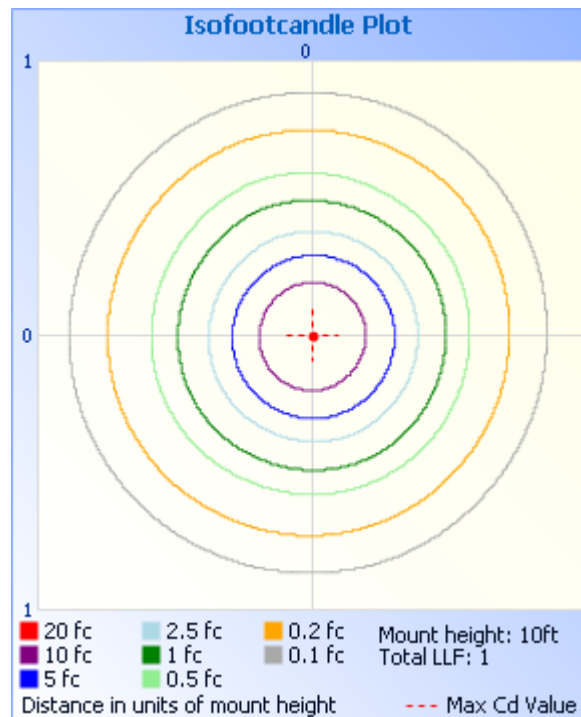
The following images depict the illuminance characteristics of the luminaire.



Beam Angle



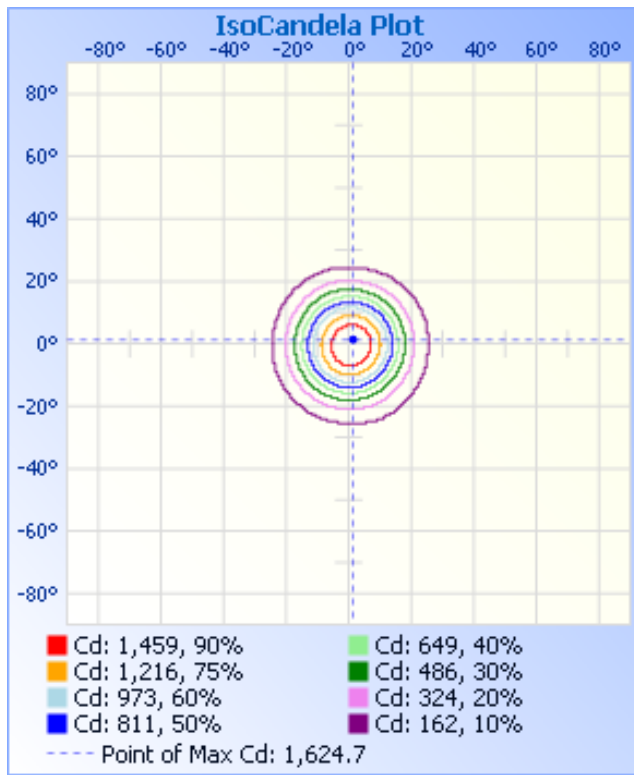
Field Angle



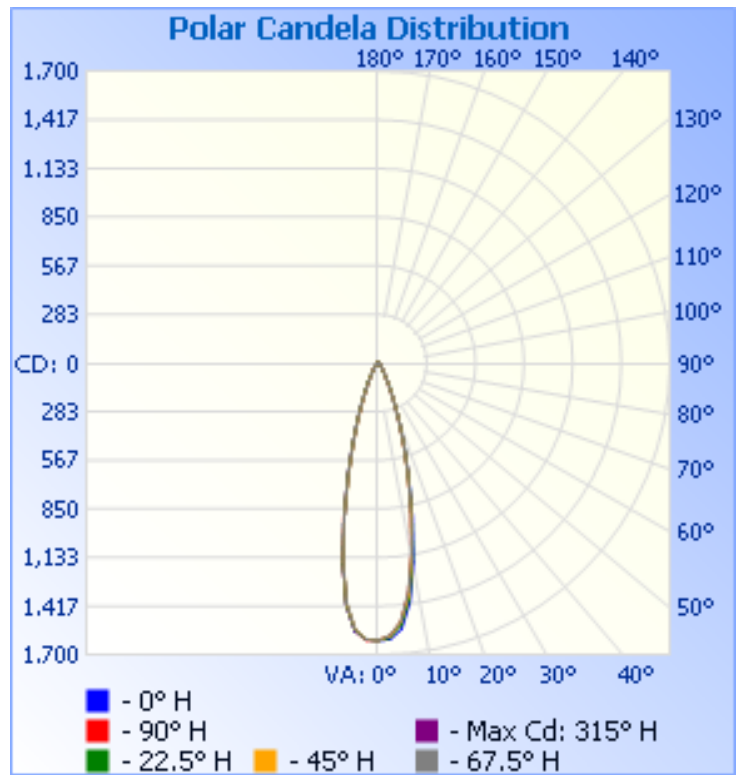
Illuminance Plot (Footcandles)

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	1615	1615	1615	1615	1615	1615	1615	1615	1615	1615	1615	1615	1615	1615	1615	1615	1615
2.5	1611	1602	1593	1587	1590	1597	1601	1608	1611	1610	1611	1613	1617	1622	1625	1621	1610
5.0	1557	1534	1515	1510	1514	1528	1545	1562	1566	1561	1555	1556	1566	1574	1577	1571	1556
7.5	1405	1386	1364	1347	1355	1373	1397	1418	1423	1420	1416	1411	1423	1432	1434	1426	1403
10.0	1175	1151	1130	1121	1124	1140	1161	1175	1186	1185	1178	1181	1188	1196	1197	1181	1173
12.5	915	904	889	880	885	893	903	915	918	914	910	916	922	928	929	924	911
15.0	685	679	670	670	670	673	682	686	680	677	669	674	681	687	692	689	684
17.5	499	499	491	489	491	492	495	495	493	488	478	482	490	496	501	495	498
20.0	347	351	344	340	343	345	347	348	350	350	337	339	346	350	351	344	347
22.5	234	237	232	227	229	232	234	238	244	248	233	235	241	242	239	232	234
25.0	156	158	154	150	151	156	156	160	168	173	162	162	166	166	162	156	156
27.5	107	107	103	100	102	106	108	110	118	123	116	114	115	115	113	108	107
30.0	76	74	72	71	71	75	78	81	86	90	84	82	84	83	81	77	76
32.5	56	54	53	52	52	56	60	60	65	67	64	63	62	62	60	58	56
35.0	42	40	39	38	39	41	44	46	49	51	48	47	48	47	45	43	42
37.5	31	31	29	29	30	31	34	35	37	38	37	36	36	36	35	32	31
40.0	24	24	23	23	23	24	26	27	28	29	28	28	28	28	27	25	24
42.5	19	19	19	18	18	19	20	21	22	22	22	22	22	22	21	20	19
45.0	15	15	15	15	14	15	16	17	17	17	17	17	17	17	16	16	15
47.5	12	13	12	12	11	12	12	13	13	13	13	13	13	13	13	12	12
50.0	10	10	10	9	9	9	10	10	10	10	10	10	10	10	10	10	10
52.5	8	8	8	8	7	7	8	8	8	8	8	8	8	8	8	8	8
55.0	7	7	7	6	6	6	7	7	7	6	6	6	7	7	6	7	7
57.5	6	6	6	6	5	5	6	6	6	5	6	6	6	6	5	6	6
60.0	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
62.5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5
65.0	5	5	5	5	4	4	5	5	4	4	4	4	4	4	4	5	5
67.5	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
70.0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
72.5	4	4	4	4	4	4	4	4	4	3	4	4	4	4	3	4	4
75.0	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
77.5	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
80.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
82.5	2	2	2	2	2	1	2	2	2	1	1	1	1	2	2	2	2
85.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
87.5	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	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.