



IESNA LM79-2008 Test Report

TÜV SÜD America

Photometric Testing and Evaluation in Accordance with LM79-2008

Report Prepared for:

Ivars Lauzums
Certification Manager

Lighting Science Group Corporation

1227 South Patrick Drive, Bldg. 2A
Satellite Beach, FL 32937
USA

Telephone: (321) 779-5528

Sample Tested: LS 38 90WE W27 NFL G1 BX
Manufacturer: Lighting Science Group Corporation

Technical Report Number: JI1400199-12-LM79
Report Issue Date: January 23rd, 2014
Total Number of Pages: 9 (including this page)

Report Prepared by:

Byrd Evans
TÜV SÜD Project Handler

Report Reviewed by:

Bryan Cubitt
TÜV SÜD Program Manager



IESNA LM79-2008 TEST REPORT

Report# JI1400199-12-LM79

January 23, 2014

Summary of Key Test Results

Model# **LS 38 90WE W27 NFL G1 BX**
 Manufacturer **LSGC**
 TÜV Sample# **1183-12**
 Date of Test **January 13th 2014**



Notes:

Tested in LBU orientation (Lamp-Base-Up)

Parameter	Measured Result
Luminous Flux	1043.0 Lumens
Input Power	17.72 Watts
Efficacy	58.86 Lumens/Watt
C.C.T.	2729 K
C.R.I. (R _a)	82.0
Stabilization Time	60 minutes

The above results are recorded / derived from measurements in accordance with LM79-08



IESNA LM79-2008 TEST REPORT

January 23, 2014

TABLE OF CONTENTS

Test Results 4

Spectral Flux and Chromaticity Diagram 5

Zonal Lumen Summary 5

Illuminance Plots 6

Candela Plots 6

Candela Tabulation 7

Photometric Testing Information 8

Equipment List: 9



IESNA LM79-2008 TEST REPORT

January 23, 2014

Test Results –

The following results were obtained after stabilization of the sample in accordance with the requirements set forth in section 5.0 of IES LM79-2008. Stability is achieved when the variation of 3 readings of light output and electrical power over a period of 30 minutes, taken 15 minutes apart, is less than 0.5%.

Photometric Results	LS 38 90WE W27 NFL G1 BX	
	Integrating Sphere	Goniophotometer
Total Luminous Flux (Lumens)	1043.0	1057.5
Luminous Efficacy (Lumens/Watt)	58.86	59.81
Total Radiant Flux (Watts)	3.4	-
Correlated Color Temperature (CCT)	2729	-
Color Rendering Index (CRI – R _a)	82.0	-
R ₉ Value	13.6	-
Chromaticity (Chroma x / Chroma y)	0.4569 / 0.4093	-
Chromaticity (Chroma u / Chroma v)	0.2612 / 0.3509	-
Chromaticity (Chroma u' / Chroma v')	0.2612 / 0.5264	-
D _{uv} Value	-0.00024	-

Electrical Results	LS 38 90WE W27 NFL G1 BX	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	17.72	17.68
Input Voltage (Volts AC)	119.98	120.01
Input Current (Amps)	0.158	0.160
Power Factor	0.935	0.935
Input Frequency (Hertz)	60.0	60.0
A-THD (Current %)	35.56 %	35.47 %

Additional Parameters	LS 38 90WE W27 NFL G1 BX	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	60 minutes	58 minutes
Test Geometry Configuration	4π	Type C
Spectroradiometer	Labsphere CDS1100	Gigahertz Optik P9801
Ambient Temperature	24.7 °C	24.1 °C
ISTMT (In-Situ Temperature Measurement)	Not tested	
Spacing Criteria	N/A	



IESNA LM79-2008 TEST REPORT

Report# J11400199-12-LM79

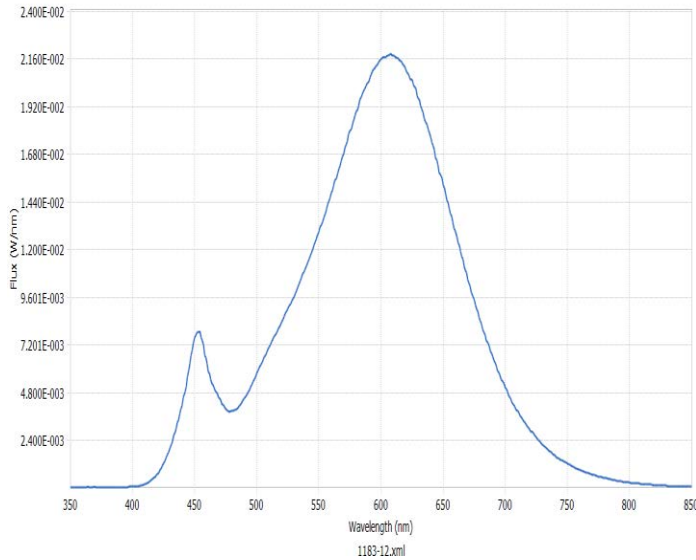
January 23, 2014

Spectral Flux and Chromaticity Diagram

Spectral Flux

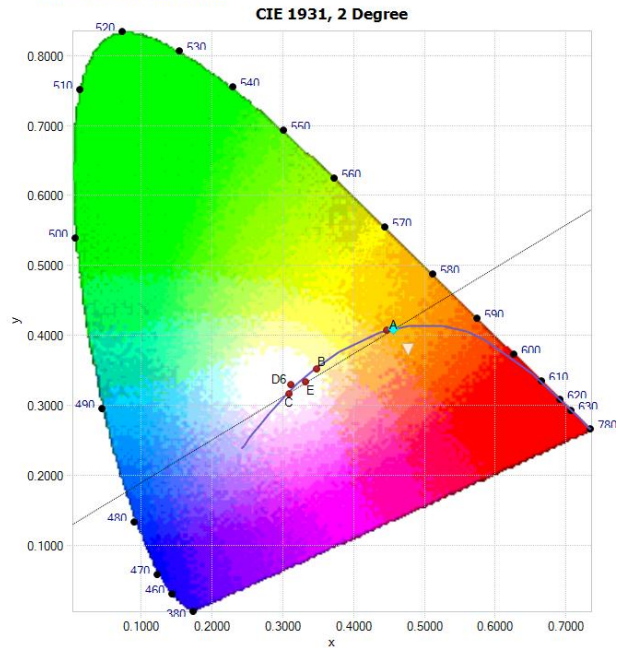
Chromaticity Diagram

▼ SPECTRAL FLUX GRAPH:



**Spectral response of the Radiant Flux
(350nm to 850nm)**

▼ CHROMATICITY DIAGRAM:



Tristimulus values (from page 5):

$$x / y = 0.4569 / 0.4093$$

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

Parameter	Stable Data
Peak Wavelength (nm)	607.6
Dominant Wavelength (nm)	584.1

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	1004.9	95.0 %
60 - 90	52.5	5.0 %
0 - 90	1057.5	100 %
90 - 180	0.0	0.0 %
0 - 180	1057.5	100 %

TUV SUD America, Inc.
5945 Cabot Parkway, Suite 100,
Alpharetta GA 30005

Telephone: 678-341-5900 www.tuvamerica.com

Page 5

NRG_F_10.04

Confidential Report



TUV SUD America is accredited under the NVLAP EEL program.



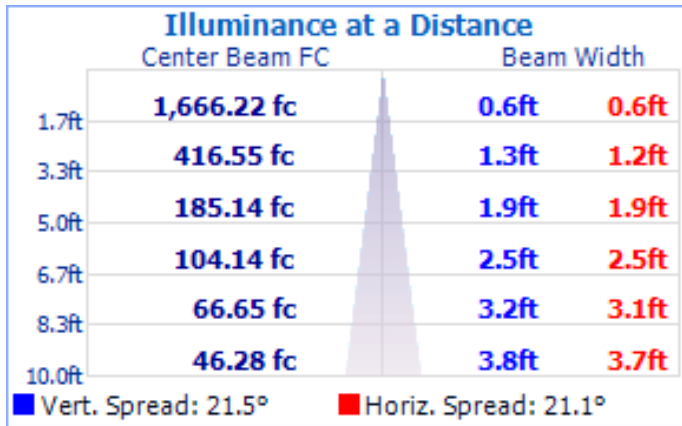


IESNA LM79-2008 TEST REPORT

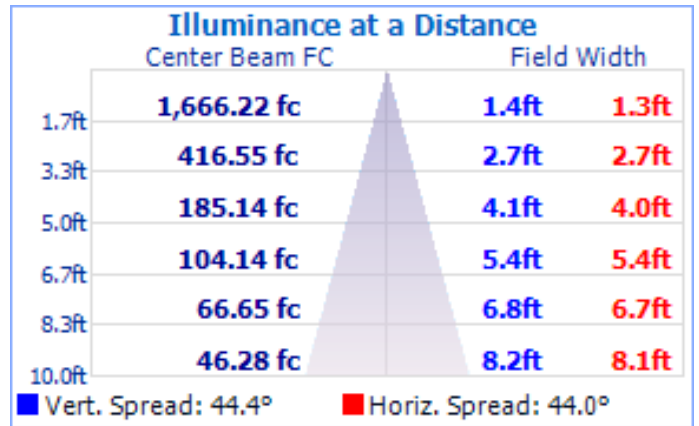
January 23, 2014

Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.



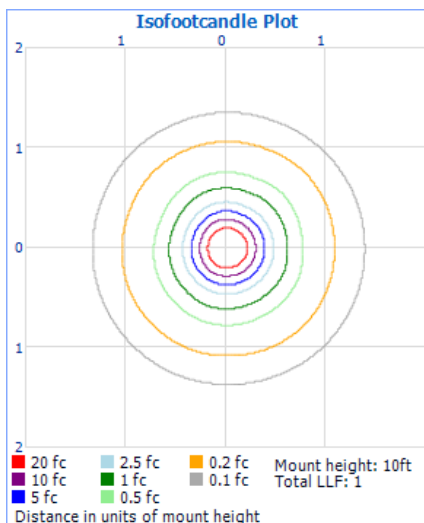
Beam Angle = 21.5°



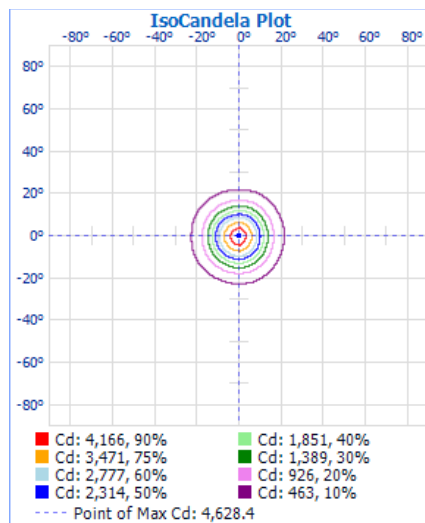
Field Angle = 44.4°

Test Results – Candela Plots

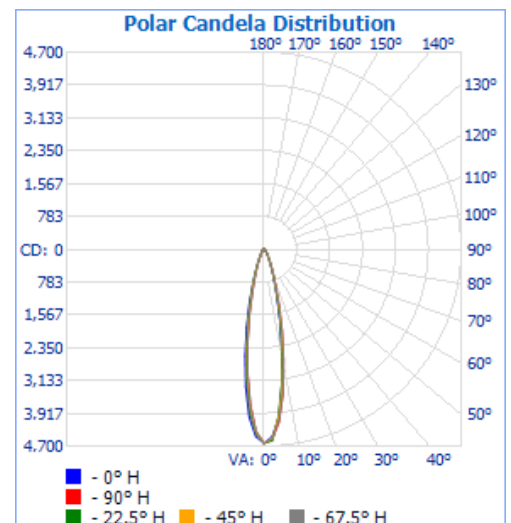
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela



IESNA LM79-2008 TEST REPORT

January 23, 2014

Test Results – Candela Tabulation

The table below displays the tabulated Candela measurements from the IES file:

Horizontal (lateral) angles are shown in **red** across the top of the table, in increments of 22.5°.

Vertical (longitudinal) angles are shown in **blue** down the side of the table, in increments of 2.5°.

	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	4628	4628	4628	4628	4628	4628	4628	4628	4628	4628	4628	4628	4628	4628	4628	4628	4628
2.5	4474	4572	4521	4507	4539	4510	4561	4582	4476	4410	4376	4349	4343	4345	4369	4410	4474
5.0	4037	3977	4016	4100	4137	4101	3997	4153	4025	3889	3795	3739	3726	3744	3814	3919	4037
7.5	3262	3228	3341	3444	3476	3428	3326	3389	3326	3185	3074	3005	2976	2995	3077	3206	3262
10.0	2445	2447	2584	2679	2693	2678	2591	2586	2588	2466	2345	2265	2236	2248	2330	2451	2445
12.5	1748	1774	1891	1976	1986	1980	1914	1884	1911	1811	1699	1609	1587	1611	1683	1784	1748
15.0	1199	1249	1326	1383	1396	1392	1359	1326	1354	1275	1176	1098	1074	1104	1165	1243	1199
17.5	836	874	922	939	958	950	950	913	922	874	810	760	754	770	806	856	836
20.0	598	619	658	681	684	689	668	633	656	619	568	530	532	541	566	608	598
22.5	425	443	469	486	487	490	474	446	460	435	399	370	376	383	398	431	425
25.0	312	321	340	354	351	352	341	318	327	312	284	262	270	277	286	311	312
27.5	235	237	251	264	254	255	252	233	237	230	206	190	199	205	210	231	235
30.0	179	178	189	199	188	191	193	174	176	174	155	143	151	156	160	176	179
32.5	142	140	147	155	144	147	152	136	137	136	123	113	120	125	128	139	142
35.0	118	116	120	126	116	119	125	113	113	112	103	95	100	105	108	115	118
37.5	102	101	103	106	98	102	106	97	98	96	91	84	86	91	94	99	102
40.0	90	89	91	92	86	89	93	86	86	85	81	75	77	81	83	87	90
42.5	79	80	81	81	77	80	82	76	77	75	73	68	69	72	75	77	79
45.0	70	71	73	72	70	72	73	68	68	67	66	62	63	65	67	69	70
47.5	62	64	66	65	63	65	65	62	61	60	59	57	57	59	60	62	62
50.0	56	58	59	59	58	58	58	56	56	54	54	52	52	54	54	56	56
52.5	51	52	53	53	53	53	53	50	51	49	49	48	48	49	49	50	51
55.0	46	47	48	49	48	48	47	46	46	44	44	44	44	44	45	46	46
57.5	42	42	43	44	44	44	43	41	41	40	40	40	40	40	40	42	42
60.0	38	38	39	40	40	40	38	37	37	36	36	36	36	36	36	38	38
62.5	34	34	35	36	36	35	34	33	33	32	32	32	32	32	33	34	34
65.0	31	31	31	32	32	31	30	29	30	29	28	29	29	29	29	31	31
67.5	27	27	28	28	29	28	27	26	27	25	25	25	25	25	26	27	27
70.0	24	24	24	24	25	24	23	23	23	22	22	22	22	22	22	24	24
72.5	21	20	21	21	21	21	20	19	20	19	19	19	19	19	19	20	21
75.0	17	17	17	18	18	18	17	16	17	16	15	15	16	16	16	17	17
77.5	14	14	14	14	15	14	14	13	14	13	12	12	12	13	13	14	14
80.0	10	11	11	11	11	11	11	10	10	10	9	9	9	10	10	11	10
82.5	7	8	8	8	8	8	8	7	7	7	6	6	6	7	7	8	7
85.0	4	5	5	5	5	5	5	4	4	4	4	4	4	4	5	4	4
87.5	2	2	3	3	3	3	2	1	2	1	1	1	1	1	2	2	2
90.0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0

Maximum Candela = **4628.4** at Horizontal 0.0°, Vertical: 0.0°



IESNA LM79-2008 TEST REPORT

January 23, 2014

TÜV SÜD Photometric Testing Information

Testing is performed in accordance with the procedures outlined in IESNA LM79-2008. The sample is evaluated for photometric and electrical characteristics using an integrating sphere and a goniophotometer, located in an accredited, temperature and humidity-controlled, draft free photometric laboratory.

Sphere Geometry

The integrating spheres used for measurement utilize a “ 4π geometry” configuration in accordance with section 9 of IES LM-79-2008 and is applicable for all types of SSL products (directional and non-directional light projections). The spectroradiometer is an array-type detector manufactured and calibrated by Labsphere (Model# CDS1100).

Self-Absorption Correction

The integrating sphere uses self-absorption correction to eliminate errors due to mismatches between the standard reference lamp and the test samples being measured. This auxiliary correction lamp is a halogen type lamp powered by a calibrated Lamp Power Supply manufactured and calibrated by Labsphere (model LPS150). Ambient temperature is measured using a thermocouple located inside the integrating sphere at the same height as the sample under test (UUT) and not more than 1 meter in horizontal distance away from the sample (section 2.2 of LM79-2008). The thermocouple is located behind a baffle in order to eliminate any direct optical radiation from the sample under test.

Sample Stabilization

The sample (UUT) is placed inside the integrating sphere and powered by a regulated and conditioned alternating or direct current supply. The stabilization times shown on the results pages of this report denote the time of the 3rd measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization in accordance with section 5.0 of LM79-2008.

Sphere Calibration

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

Manufacturer: EYE Lighting International

Model# J94/JD28V75W

Voltage = 28.0 Volts DC

Wattage = 75.0 Watts

Calibration Current = 2.679 Amperes

Luminous Flux = 1685 Lumens

Calibration Date = 2-17-2011 (calibrated by Labsphere – NIST traceable).

Continued.....

TÜV SÜD America, Inc.

5945 Cabot Parkway, Suite 100,
Alpharetta GA 30005

Telephone: 678-341-5900 www.tuvamerica.com

Page 8

NRG_F_10.04

Confidential Report



TÜV SÜD America is
accredited under the
NVLAP EEL program.



IESNA LM79-2008 TEST REPORT

Report# JI1400199-12-LM79

January 23, 2014

TÜV SÜD Photometric Testing Information (continued)

Goniophotometer

The Goniophotometer is a Type C optical measurement system in accordance with section 9.3.1 of IESNA LM79-2008.

Goniophotometer Calibration

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

Manufacturer: General Electric
Part Number: CSB-110
Lamp Number: 105-A
Voltage: 16.71 Volts DC
Wattage: 150.0 Watts
Calibration Current: 4.847 Amperes
Luminous Intensity: 166.3 Candelas
Calibration Date: 11-07-2011 (NIST traceable)

TÜV SÜD Test Equipment List:

TÜV SÜD Sphere System – contains the following:			
Description	Manufacturer / Model#	TÜV SÜD Ref#	Calibration Due Date
Integrating Sphere	Labsphere LM760	SPH003	weekly
Spectroradiometer	Labsphere CDS1100	ATLE0048	9/7/2016
Power Analyzer	Yokogawa WT210	ATLE0058	3/7/2014
Power Source	Chroma 61602	AC003	N/A
Thermometer	Fluke 52-II	ATLE0008	11/17/2014
TÜV SÜD Goniophotometer System – contains the following:			
Goniophotometer	M.E. GONC01	GON001	weekly
Spectroradiometer	Gigahertz Optik P9801	GIG001	weekly
Power Analyzer	Yokogawa WT210	ATLE0031	11/16/2014
Power Source	Chroma 61602	AC006	N/A

This technical report may only be quoted in full. Any use for advertising purposes must be granted in writing. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government

TÜV SÜD America, Inc.
5945 Cabot Parkway, Suite 100,
Alpharetta GA 30005

Telephone: 678-341-5900 www.tuvamerica.com

Page 9

NRG_F_10.04

Confidential Report



TÜV SÜD America is accredited under the NVLAP EEL program.

