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 120WE NW FL G1 BX**
Manufacturer:	**Lighting Science Group Corporation**
Technical Report Number:	**JI1400199-20-LM79**
Report Issue Date:	**January 24th, 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

January 24, 2014

Summary of Key Test Results

Model#	**LS 38 120WE NW FL G1 BX**
Manufacturer	LSGC
TÜV Sample#	1183-20
Date of Test	January 14th 2014

Notes:

Tested in LBU orientation (Lamp-Base-Up)

Parameter	Measured Result
Luminous Flux	**1510.0 Lumens**
Input Power	**20.72 Watts**
Efficacy	**72.87 Lumens/Watt**
C.C.T.	**3923 K**
C.R.I. (R_a)	**82.8**
Stabilization Time	**60 minutes**

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

IESNA LM79-2008
TEST REPORT

January 24, 2014

TABLE OF CONTENTS

IESNA LM79-2008
TEST REPORT

January 24, 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 120WE NW FL G1 BX	
	Integrating Sphere	Goniophotometer
Total Luminous Flux (Lumens)	1510.0	1495.3
Luminous Efficacy (Lumens/Watt)	72.87	72.27
Total Radiant Flux (Watts)	4.6	-
Correlated Color Temperature (CCT)	3923	-
Color Rendering Index (CRI – R_a)	82.8	-
R_9 Value	4.6	-
Chromaticity (Chroma x / Chroma y)	0.3847 / 0.3820	-
Chromaticity (Chroma u / Chroma v)	0.2258 / 0.3363	-
Chromaticity (Chroma u' / Chroma v')	0.2258 / 0.5045	-
D_{uv} Value	0.00122	-

Electrical Results	LS 38 120WE NW FL G1 BX	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	20.72	20.69
Input Voltage (Volts AC)	120.01	119.97
Input Current (Amps)	0.181	0.180
Power Factor	0.955	0.956
Input Frequency (Hertz)	60.0	60.0
A-THD (Current %)	29.50 %	29.37 %

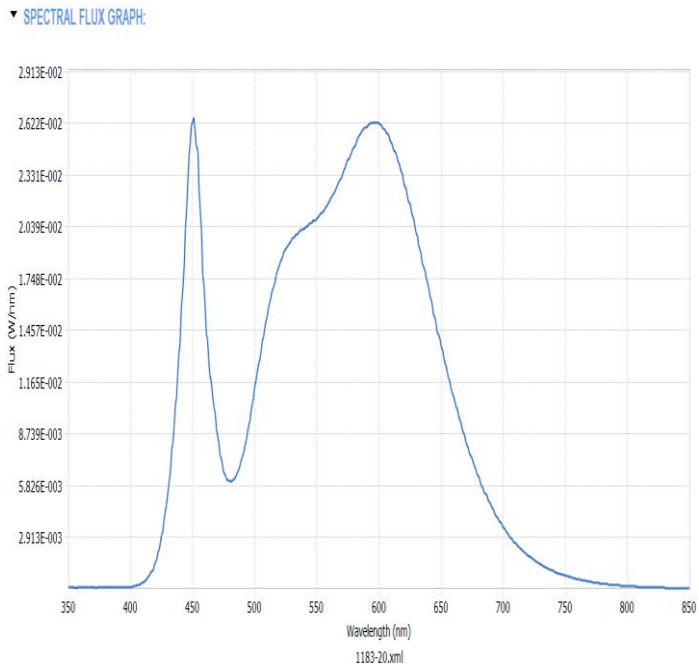
Additional Parameters	LS 38 120WE NW FL G1 BX	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	60 minutes	55 minutes
Test Geometry Configuration	4π	Type C
Spectroradiometer	Labsphere CDS1100	Gigahertz Optik P9801
Ambient Temperature	24.7 °C	25.1 °C
ISTMT (In-Situ Temperature Measurement)	Not tested	
Spacing Criteria	N/A	

IESNA LM79-2008
TEST REPORT

January 24, 2014

Spectral Flux and Chromaticity Diagram

Spectral Flux

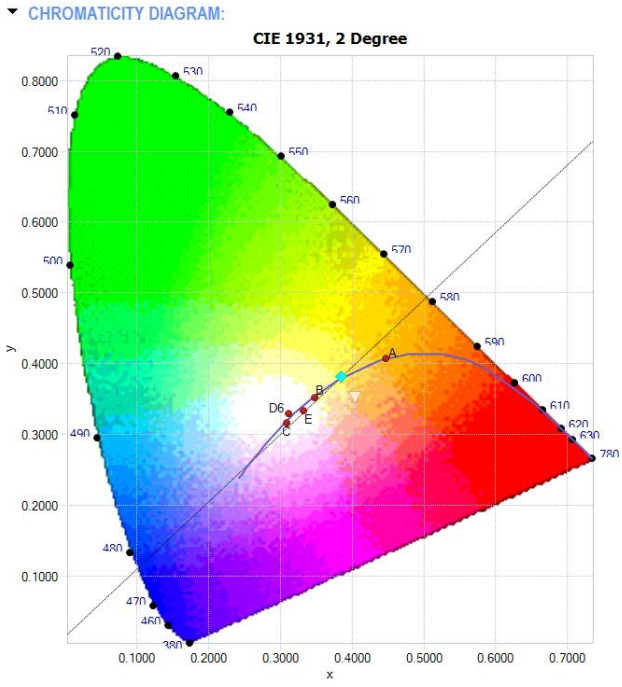


Spectral response of the Radiant Flux

(350nm to 850nm)

Parameter	Stable Data
Peak Wavelength (nm)	450.4
Dominant Wavelength (nm)	578.7

Chromaticity Diagram



Tristimulus values (from page 5):

x / y = 0.3847 / 0.3820

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

Zonal Lumen Summary

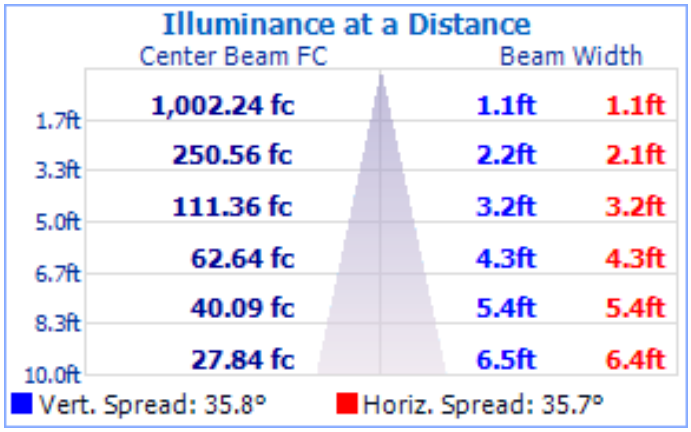
Zone	Lumens	% Lamp / Luminaire
0 - 60	1425.4	95.3 %
60 - 90	69.9	4.7 %
0 - 90	1495.3	100 %
90 - 180	0.0	0.0 %
0 - 180	1495.3	100 %

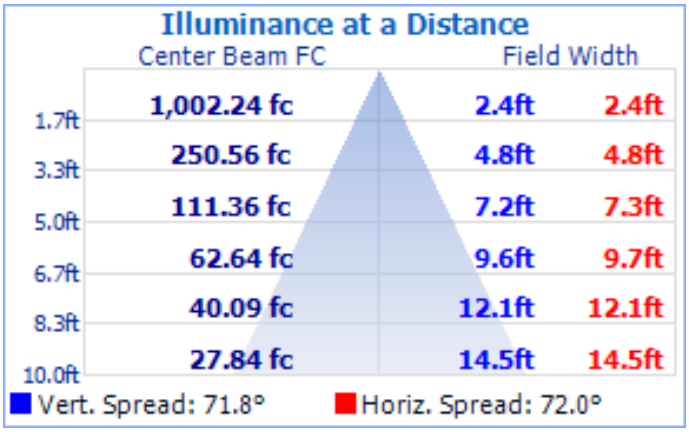
IESNA LM79-2008
TEST REPORT

January 24, 2014

Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.



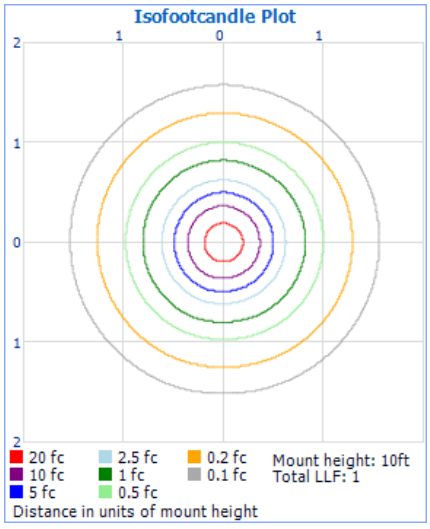


Beam Angle = 35.8°

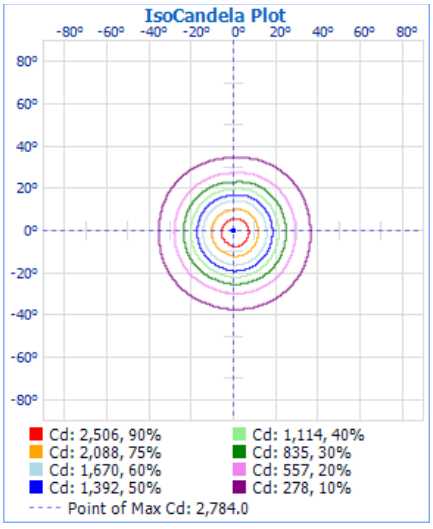
Field Angle = 71.8°

Test Results – Candela Plots

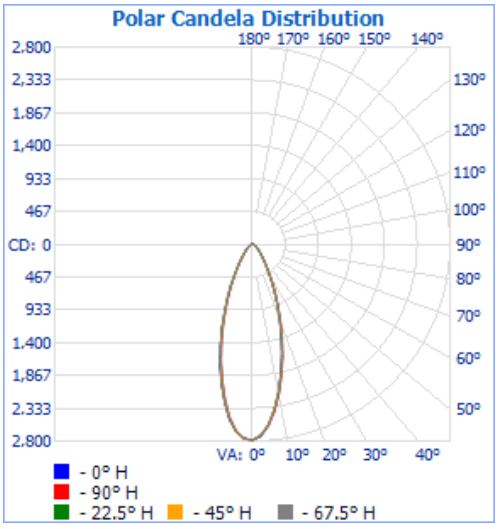
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela

IESNA LM79-2008
TEST REPORT

January 24, 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	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**	**2784**
2.5	2732	2710	2716	2720	2726	2736	2735	2744	2763	2772	2770	2763	2759	2752	2751	2747	2732
5.0	2581	2573	2575	2578	2591	2604	2616	2622	2676	2675	2674	2662	2655	2650	2631	2625	2581
7.5	2370	2365	2370	2381	2397	2410	2429	2442	2513	2501	2495	2491	2477	2459	2450	2447	2370
10.0	2130	2121	2132	2147	2161	2179	2190	2199	2276	2279	2271	2255	2238	2215	2208	2195	2130
12.5	1857	1874	1881	1890	1908	1928	1941	1951	2035	2029	2015	1994	1977	1963	1944	1943	1857
15.0	1604	1612	1624	1639	1656	1669	1693	1696	1781	1766	1748	1735	1715	1699	1688	1687	1604
17.5	1347	1352	1368	1385	1399	1416	1423	1438	1513	1507	1489	1475	1455	1437	1426	1425	1347
20.0	1118	1118	1131	1143	1157	1170	1186	1196	1271	1263	1247	1224	1208	1197	1192	1185	1118
22.5	909	914	924	933	944	958	969	979	1036	1030	1020	998	986	976	962	964	909
25.0	727	730	741	753	765	775	779	790	844	839	826	813	801	792	781	779	727
27.5	570	570	581	592	606	613	622	626	676	671	661	648	636	626	621	613	570
30.0	442	445	452	462	471	478	480	486	525	525	517	508	499	491	481	476	442
32.5	342	348	355	363	369	376	381	383	412	411	405	398	390	382	376	370	342
35.0	274	278	283	291	296	300	305	307	328	326	321	314	308	302	296	291	274
37.5	218	223	229	236	241	245	248	249	264	263	257	253	246	240	236	232	218
40.0	178	181	187	193	198	202	204	204	216	215	210	204	199	193	190	187	178
42.5	146	149	155	159	164	167	169	170	178	177	172	167	162	158	156	153	146
45.0	123	126	130	134	138	140	142	142	149	146	143	139	136	132	130	129	123
47.5	102	105	109	113	116	118	121	121	127	125	121	118	114	110	108	107	102
50.0	86	88	92	95	98	99	101	101	106	104	101	98	95	92	90	90	86
52.5	74	76	78	81	84	85	85	86	90	88	86	84	81	78	77	77	74
55.0	64	65	67	70	72	73	73	74	77	76	74	72	70	68	66	66	64
57.5	55	57	58	60	62	63	64	65	67	66	64	62	61	59	58	57	55
60.0	48	49	50	52	54	55	55	56	58	57	56	54	53	52	50	50	48
62.5	42	42	44	45	47	47	48	49	50	50	48	47	46	45	44	43	42
65.0	36	37	38	40	41	41	42	43	44	44	42	41	40	39	38	38	36
67.5	32	32	34	35	36	36	37	37	39	38	37	36	35	34	33	33	32
70.0	28	28	29	30	31	32	32	33	34	34	33	32	31	30	29	29	28
72.5	24	24	25	26	27	27	28	28	30	29	28	27	26	26	25	25	24
75.0	19	20	21	22	22	23	24	24	25	25	24	23	22	22	21	21	19
77.5	15	15	16	17	18	18	19	19	20	20	19	19	18	17	16	16	15
80.0	11	11	12	12	13	14	14	14	16	15	15	14	13	13	12	12	11
82.5	7	7	8	8	9	9	10	10	11	11	10	10	9	9	8	8	7
85.0	3	4	4	4	5	5	5	6	7	7	6	6	5	5	4	4	3
87.5	1	1	1	2	2	2	2	2	3	3	3	2	2	2	1	1	1
90.0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Maximum Candela = **2784.0** at Horizontal 0.0°, Vertical: 0.0°

IESNA LM79-2008
TEST REPORT

January 24, 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…..

IESNA LM79-2008
TEST REPORT

January 24, 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