



IESNA LM79-2008 Test Report

TÜV SÜD America

Photometric Testing and Evaluation in Accordance with LM79-2008

Report Prepared for:

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1227 South Patrick Drive, Bldg. 2A
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Sample Tested: DFN A19 40WE W27 120
Manufacturer: Lighting Science Group Corporation

Technical Report Number: JI1300780-LM79
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Summary of Key Test Results

Model# **DFN A19 40WE W27 120**
 Manufacturer **LSGC**
 TÜV Sample# **608-21**
 Date of Test **February 20th 2013**



Notes:

Tested in LBU orientation (Lamp-Base-Up)



Parameter	Measured Result
Luminous Flux	517.9 Lumens
Input Power	7.27 Watts
Efficacy	71.29 Lumens/Watt
C.C.T.	2674 K
C.R.I. (R _a)	81.1
% Lumens in 135°-180° zone	16.1 %
Stabilization Time	60 minutes
In-Situ Temp Test (ISTMT)**	TBD

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

**ISTMT in accordance with "Energy Star Program Requirements for Integral LED Lamps – Version 1.4".

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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	DFN A19 40WE W27 120	
	Integrating Sphere	Goniophotometer
Total Luminous Flux (Lumens)	517.9	542.1
Luminous Efficacy (Lumens/Watt)	71.29	64.04
Total Radiant Flux (Watts)	1.7	-
Correlated Color Temperature (CCT)	2674	-
Color Rendering Index (CRI – R _a)	81.1	-
R ₉ Value	10.7	-
Chromaticity (Chroma x / Chroma y)	0.4604 / 0.4084	-
Chromaticity (Chroma u / Chroma v)	0.2638 / 0.3511	-
Chromaticity (Chroma u' / Chroma v')	0.2638 / 0.5266	-
D _{uv} Value	-0.00084	-

Electrical Results	DFN A19 40WE W27 120	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	7.27	7.26
Input Voltage (Volts AC)	119.98	119.75
Input Current (Amps)	0.064	0.060
Power Factor	0.943	0.999
Input Frequency (Hertz)	60.0	60.0
A-THD (Current %)	27.49 %	27.73%

Additional Parameters	DFN A19 40WE W27 120	
	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	25.3 °C	24.8 °C
ISTMT (In-Situ Temperature Measurement)	TBD	
Spacing Criteria	N/A (0° – 180°) / N/A (90° – 270°)	



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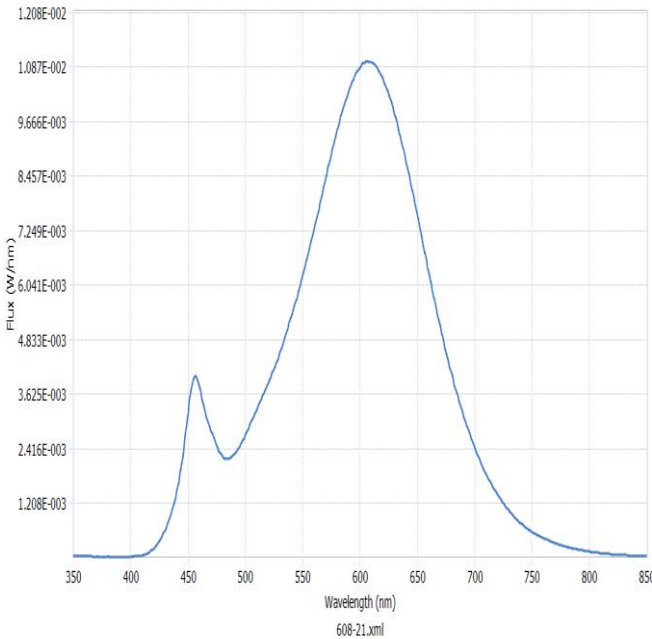
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Spectral Flux and Chromaticity Diagram

Spectral Flux

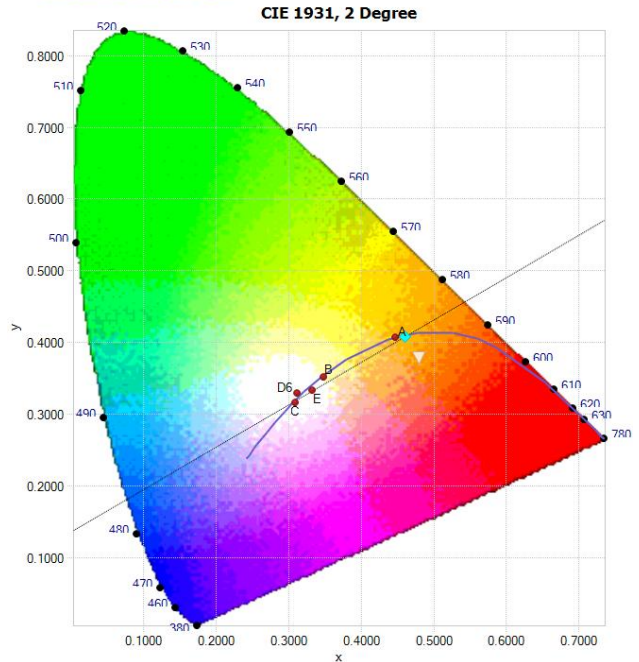
▼ SPECTRAL FLUX GRAPH:



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

Chromaticity Diagram

▼ CHROMATICITY DIAGRAM:



Tristimulus values (from page 4):

$$x / y = 0.4604 / 0.4084$$

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

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	43.7	26.8 %
60 - 90	127.4	23.5 %
0 - 90	272.6	50.3 %
90 - 180	269.5	49.7 %
0 - 180	542.1	100.0 %
135 - 180	88.1	16.1 %

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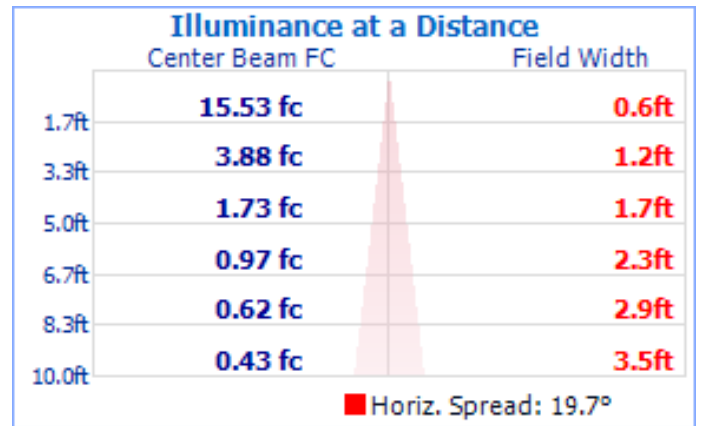
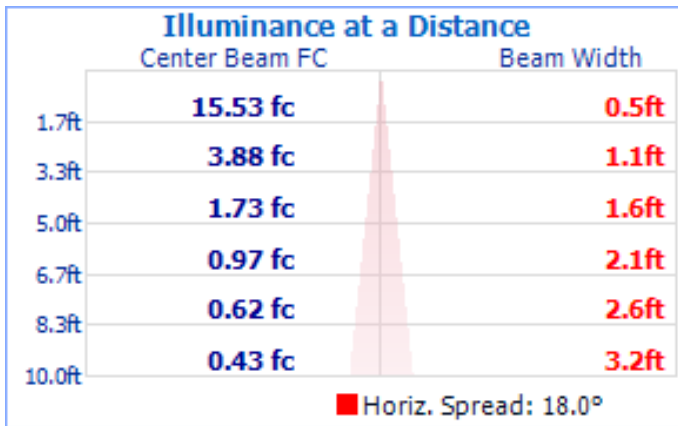


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Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.

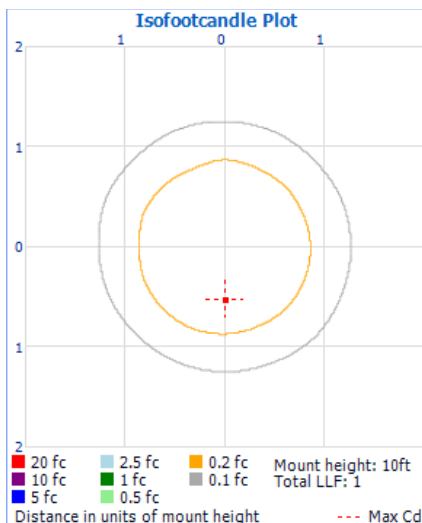


Beam Angle = N/A

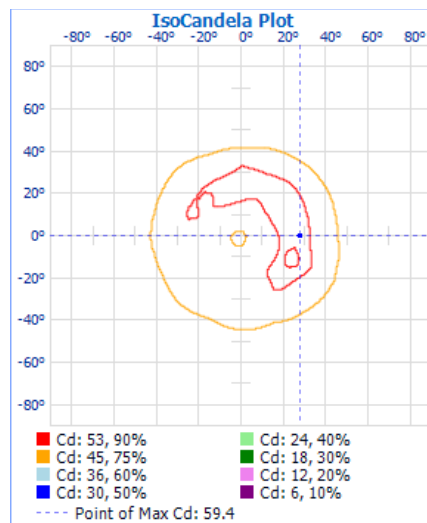
Field Angle = N/A

Test Results – Candela Plots

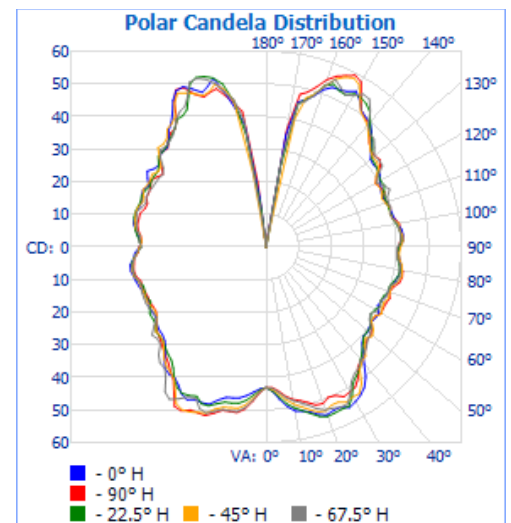
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela



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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	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
2.5	44	44	44	43	43	43	43	43	44	44	44	44	45	44	44	44	44
5.0	47	46	45	45	44	44	44	44	45	46	47	47	47	47	47	46	47
7.5	49	48	47	47	46	46	46	46	46	47	49	50	50	50	50	49	49
10.0	51	50	49	48	47	47	47	46	47	49	50	51	52	52	52	51	51
12.5	52	51	50	49	48	48	48	47	47	49	50	51	52	52	52	52	52
15.0	52	53	52	50	49	49	49	48	48	49	51	52	52	53	53	52	52
17.5	54	54	53	52	51	51	51	50	49	50	52	53	53	55	54	52	54
20.0	55	55	53	53	51	51	51	51	51	52	54	54	55	57	56	54	55
22.5	54	55	52	54	50	52	49	50	52	52	55	54	55	57	56	55	54
25.0	54	55	52	54	50	52	50	51	52	50	56	51	55	54	55	54	54
27.5	56	55	54	54	52	53	51	51	53	51	56	52	57	54	56	55	56
30.0	55	53	53	52	51	51	50	50	52	52	55	54	56	55	57	55	55
32.5	54	50	53	49	51	49	49	49	50	51	52	55	53	53	54	52	54
35.0	53	48	51	47	49	47	49	48	49	49	49	54	50	53	52	51	53
37.5	50	47	47	47	46	46	47	47	49	47	48	51	48	51	51	50	50
40.0	47	45	46	45	45	45	46	46	48	45	48	48	47	48	49	48	47
42.5	44	44	45	45	45	44	44	44	46	45	46	48	46	46	46	45	44
45.0	42	42	43	44	43	43	43	42	44	44	44	47	45	45	44	43	42
47.5	40	41	41	42	42	42	41	42	42	43	43	44	44	43	43	42	40
50.0	41	40	43	42	42	42	41	42	42	43	42	44	43	42	41	41	41
52.5	40	40	42	41	41	41	40	41	42	43	43	44	42	42	41	40	40
55.0	40	39	40	39	40	39	40	41	41	41	41	42	41	40	41	40	40
57.5	40	38	40	38	40	39	41	40	40	41	40	40	40	40	39	39	40
60.0	40	39	41	39	41	39	41	40	40	41	39	40	39	41	39	40	40
62.5	39	39	40	39	41	39	39	39	40	40	40	41	39	41	39	39	39
65.0	39	39	40	39	41	39	40	39	40	39	40	41	40	39	38	39	39
67.5	40	39	41	40	41	40	40	40	40	40	40	41	39	40	38	40	40
70.0	40	40	40	40	40	40	40	40	40	40	40	41	40	41	39	40	40
72.5	40	40	40	40	41	40	41	41	41	40	40	40	40	40	39	40	40
75.0	41	41	42	41	42	42	42	41	41	41	41	40	40	40	40	41	41
77.5	42	42	43	42	43	43	42	42	42	41	42	41	41	41	40	41	42
80.0	42	42	42	42	43	42	43	43	42	42	42	42	41	42	41	41	42
82.5	42	41	42	41	42	42	42	42	42	42	41	41	41	42	41	42	42
85.0	41	41	41	40	41	41	41	41	41	41	41	41	41	41	41	41	41
87.5	41	40	41	40	40	41	40	40	40	40	40	40	39	40	40	40	41
90.0	41	41	41	40	41	40	40	39	39	39	39	38	39	39	39	40	41

Maximum Candela = **59.4** at Horizontal: 90.0°, Vertical: 152.5°



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Test Results – Candela Tabulation (Continued...)

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

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	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
92.5	42	42	42	41	41	41	40	39	39	39	38	39	38	39	39	40	42
95.0	42	42	42	42	42	42	41	40	40	40	39	39	39	40	41	41	42
97.5	42	41	41	41	42	41	41	41	40	41	40	40	40	41	41	41	42
100.0	41	41	41	41	42	41	41	41	41	41	41	41	40	41	41	41	41
102.5	40	40	40	40	40	41	41	41	41	42	41	40	40	41	41	40	40
105.0	40	40	39	39	39	41	40	41	42	42	41	41	40	40	40	39	40
107.5	40	40	40	40	40	40	40	41	41	41	41	40	39	39	40	40	40
110.0	39	40	39	40	40	41	40	40	41	41	40	39	39	40	40	39	39
112.5	39	39	39	40	39	40	40	41	41	41	41	40	40	39	40	39	39
115.0	39	40	39	42	40	40	40	40	42	41	42	40	40	39	40	39	39
117.5	40	41	39	41	40	42	41	40	41	40	41	39	40	39	40	39	40
120.0	40	41	39	39	39	41	41	40	42	41	41	39	41	39	41	39	40
122.5	41	41	40	41	40	41	42	41	43	41	42	39	40	38	41	40	41
125.0	42	42	42	44	43	42	43	42	42	41	40	39	39	39	42	41	42
127.5	41	42	43	44	44	43	43	42	42	42	41	40	40	41	42	41	41
130.0	42	42	43	43	44	44	42	42	43	43	43	42	43	43	43	41	42
132.5	44	44	44	45	44	45	43	42	43	43	45	44	43	43	43	41	44
135.0	46	46	45	47	45	46	46	44	43	43	45	44	43	43	44	44	46
137.5	48	47	46	47	47	47	48	46	44	44	45	44	44	44	46	45	48
140.0	50	50	49	49	49	50	50	47	47	45	47	45	46	44	47	47	50
142.5	50	52	50	53	50	52	52	48	48	46	48	46	46	47	49	48	50
145.0	51	54	51	55	51	53	53	49	50	48	49	48	48	48	51	49	51
147.5	53	54	54	56	54	55	54	50	53	48	52	49	53	49	53	50	53
150.0	55	54	57	54	58	56	56	52	55	49	54	50	56	50	54	52	55
152.5	54	53	58	53	59	56	56	56	55	52	53	52	55	54	53	54	54
155.0	53	53	57	54	58	56	55	56	53	55	52	56	52	57	50	54	53
157.5	53	54	56	56	57	57	56	56	51	56	50	56	50	56	51	54	53
160.0	51	53	52	53	55	55	56	56	52	56	51	55	50	54	52	52	51
162.5	49	49	49	49	51	52	53	54	54	54	52	53	51	51	50	49	49
165.0	47	47	47	46	49	50	50	51	49	52	50	49	48	47	46	47	47
167.5	46	45	40	45	48	48	42	48	43	46	46	46	45	45	44	46	46
170.0	35	25	4	28	37	29	1	27	38	35	23	40	42	40	14	39	35
172.5	2	0	0	0	2	0	0	0	15	11	0	6	20	5	1	12	2
175.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0





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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.....

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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	3/7/2013
Power Source	Chroma 61602	AC003	N/A
Thermometer	Fluke 52-II	ATLE0008	11/17/2013
TÜV SÜD Goniophotometer System – contains the following:			
Goniophotometer	M.E. GONC01	GON001	weekly
Spectroradiometer	Gigahertz Optik P9801	GIG001	weekly
Power Analyzer	Yokogawa WT210	ATLE0031	11/16/2013
Power Source	Chroma 61602	AC006	N/A

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