



IESNA LM79-2008 Test Report

TÜV SÜD America

Photometric Testing and Evaluation in Accordance with LM79-2008

Report Prepared for:

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Sample Tested: VGRO 38 FL 120 (Broad)
Manufacturer: Lighting Science Group Corporation

Technical Report Number: JI1308097-1-LM79
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Page 1

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IESNA LM79-2008 TEST REPORT

Report# JI308097-1-LM79

August 14, 2013

Summary of Key Test Results

Model# **VGRO 38 FL 120 (Broad)**
Manufacturer **LSGC**
TÜV Sample# **880-1**

Date of Test **August 13th 2013**



Notes:

Tested in LBU orientation (Lamp-Base-Up)



Parameter	Measured Result
Luminous Flux	660.5 Lumens
Input Power	14.59 Watts
Efficacy	45.27 Lumens/Watt
C.C.T.	3460 K
C.R.I. (R _a)	29.0
Beam Angle	35.9°
Stabilization Time	60 minutes

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

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Page 2

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IESNA LM79-2008 TEST REPORT

Report# JI308097-1-LM79

August 14, 2013

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

August 14, 2013

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	LSGC - VGRO 38 FL 120 (Broad)	
	Integrating Sphere	Goniophotometer
Total Luminous Flux (Lumens)	660.5	664.1
Luminous Efficacy (Lumens/Watt)	45.27	45.61
Total Radiant Flux (Watts)	4.81	-
Correlated Color Temperature (CCT)	3460	-
Color Rendering Index (CRI – R _a)	29.0	-
R ₉ Value	-264.2	-
Chromaticity (Chroma x / Chroma y)	0.3772 / 0.3126	-
Chromaticity (Chroma u / Chroma v)	0.2517 / 0.3128	-
Chromaticity (Chroma u' / Chroma v')	0.2517 / 0.4691	-
D _{uv} Value	-0.03232	-

Electrical Results	LSGC - VGRO 38 FL 120 (Broad)	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	14.59	14.56
Input Voltage (Volts AC)	119.97	120.03
Input Current (Amps)	0.125	0.120
Power Factor	0.971	0.971
Input Frequency (Hertz)	60.0	60.0
A-THD (Current %)	21.16%	21.33%

Additional Parameters	LSGC - VGRO 38 FL 120 (Broad)	
	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	25.1°C	24.7°C
ISTMT (In-Situ Temperature Measurement)	Not tested	
Spacing Criteria	N/A	



IESNA LM79-2008 TEST REPORT

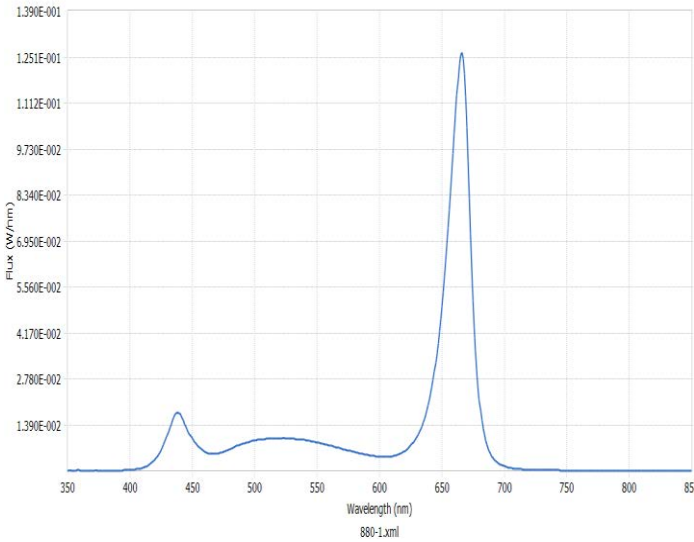
Report# JI308097-1-LM79

August 14, 2013

Spectral Flux and Chromaticity Diagram

Spectral Flux

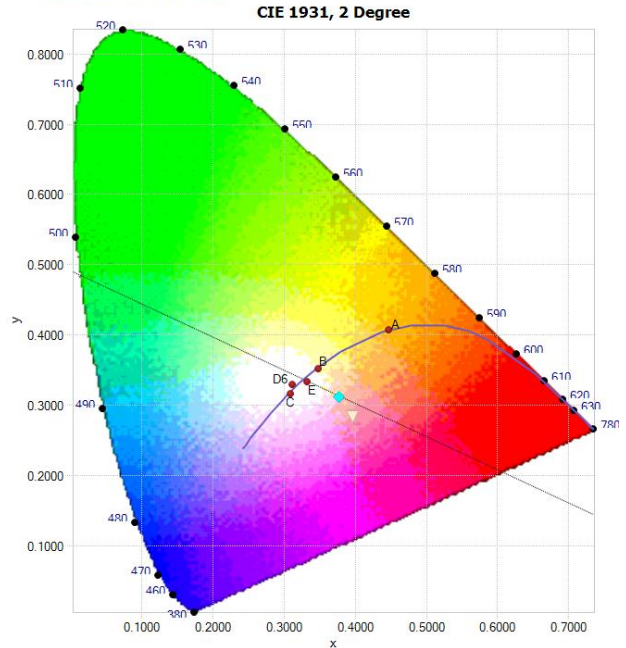
▼ SPECTRAL FLUX GRAPH:



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

Chromaticity Diagram

▼ CHROMATICITY DIAGRAM:



Tristimulus values (from page 4):

$$x / y = 0.3772 / 0.3126$$

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

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	638.3	96.1 %
60 - 90	25.8	3.9 %
0 - 90	664.1	100 %
90 - 180	0.0	0.0 %
0 - 180	664.1	100 %

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Page 5

NRG_F_10.04

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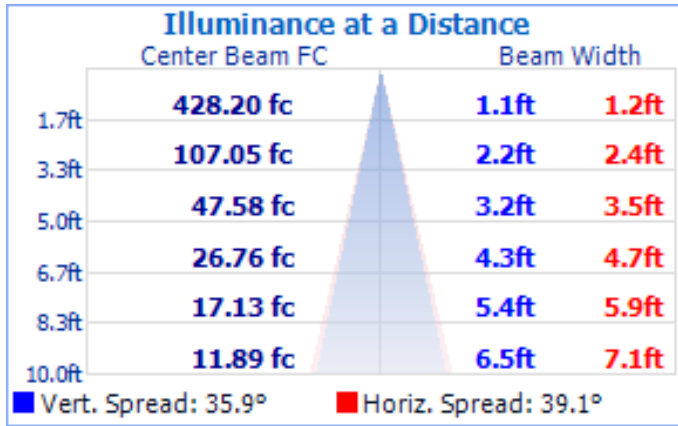


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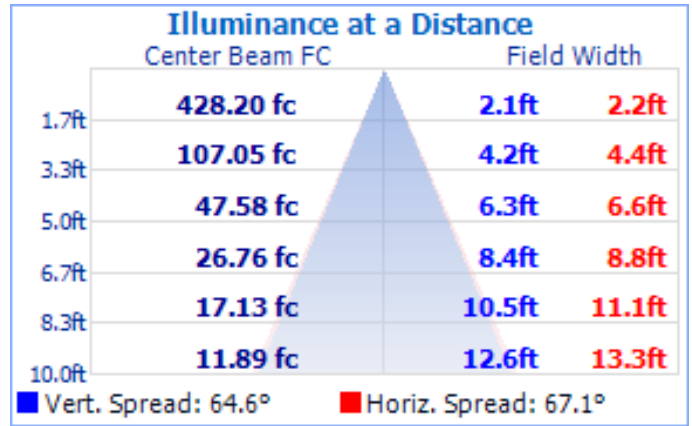
August 14, 2013

Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.



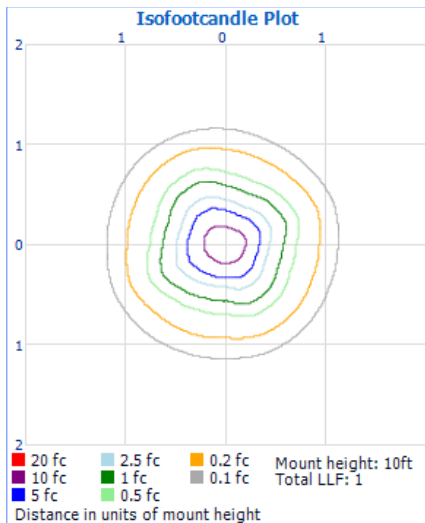
Beam Angle = 35.9°



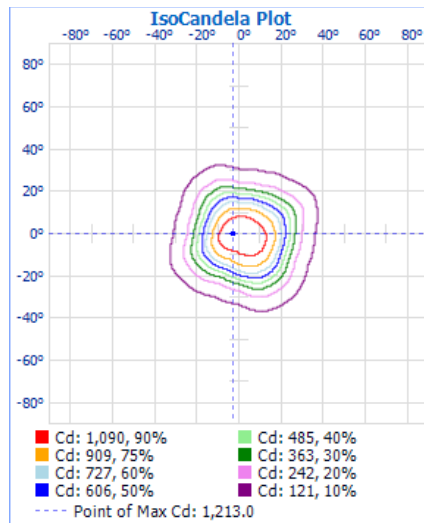
Field Angle = 64.6°

Test Results – Candela Plots

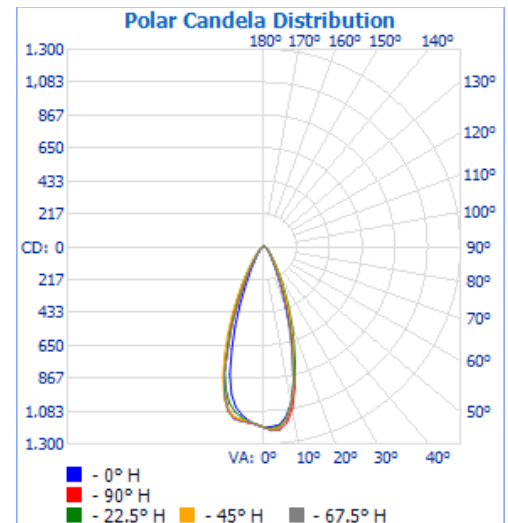
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela



IESNA LM79-2008 TEST REPORT

August 14, 2013

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	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189
2.5	1186	1197	1205	1213	1212	1201	1186	1177	1177	1171	1174	1169	1170	1175	1185	1184	1186
5.0	1178	1184	1192	1203	1210	1204	1172	1150	1151	1155	1156	1159	1164	1164	1159	1167	1178
7.5	1125	1134	1141	1147	1168	1176	1147	1108	1118	1135	1148	1160	1160	1147	1131	1134	1125
10.0	1043	1042	1048	1049	1081	1110	1086	1036	1073	1105	1137	1154	1143	1112	1084	1062	1043
12.5	905	927	921	899	945	1011	977	923	994	1055	1100	1111	1095	1053	1000	937	905
15.0	733	797	746	719	755	876	837	766	873	975	1021	1017	1006	966	875	778	733
17.5	590	658	631	556	601	692	677	599	708	866	904	879	877	853	698	623	590
20.0	428	537	505	415	446	580	547	451	559	707	765	684	693	695	589	465	428
22.5	318	424	395	305	327	457	417	328	417	600	632	541	560	601	457	335	318
25.0	231	328	305	225	238	354	316	237	301	481	501	393	421	488	346	245	231
27.5	172	251	234	169	178	271	240	178	222	375	388	283	308	388	261	184	172
30.0	133	193	178	131	138	209	181	138	168	290	296	207	225	304	198	142	133
32.5	103	150	138	101	107	161	137	109	130	223	224	157	168	238	149	112	103
35.0	84	116	108	83	86	125	105	88	102	171	170	124	130	186	115	91	84
37.5	71	90	84	70	73	98	83	73	83	131	130	98	101	144	92	76	71
40.0	60	73	68	59	62	79	66	60	69	102	99	82	82	112	75	66	60
42.5	50	58	55	49	51	64	53	51	58	80	79	69	68	85	62	56	50
45.0	43	47	45	40	42	50	44	44	49	63	64	58	56	66	51	46	43
47.5	36	38	37	34	34	40	36	36	41	49	51	48	46	52	43	39	36
50.0	31	32	30	28	29	32	30	30	35	40	42	40	38	41	37	33	31
52.5	26	27	26	24	24	26	25	26	29	33	35	33	32	33	31	28	26
55.0	22	23	22	21	21	22	22	22	25	27	28	28	27	28	26	24	22
57.5	19	20	19	18	18	19	19	19	21	23	24	24	23	23	22	21	19
60.0	17	18	17	16	16	17	17	17	18	20	21	20	20	20	19	18	17
62.5	15	15	14	14	14	14	15	15	16	18	18	18	18	18	17	16	15
65.0	13	13	12	12	12	12	13	12	14	15	16	16	16	16	15	14	13
67.5	11	11	11	10	10	11	11	11	12	13	13	14	14	13	13	12	11
70.0	10	9	9	9	9	9	9	9	11	12	12	12	12	13	11	10	10
72.5	9	8	8	8	8	8	8	8	9	10	10	10	11	10	10	9	9
75.0	7	7	7	7	7	7	7	7	8	9	9	9	10	9	8	8	7
77.5	6	6	6	5	6	6	6	6	7	8	8	8	8	8	7	6	6
80.0	4	5	4	4	5	5	5	4	6	7	7	6	7	6	6	5	4
82.5	3	3	3	3	3	4	4	3	5	6	6	5	5	5	5	4	3
85.0	2	2	3	2	2	3	3	2	3	5	5	4	4	4	4	3	2
87.5	2	2	2	2	2	2	3	2	2	3	4	3	3	3	3	2	2
90.0	1	1	1	1	1	2	2	2	2	2	3	2	2	2	2	1	1

Maximum Candela =1213.0 at Horizontal 67.5°, Vertical: 2.5°



IESNA LM79-2008 TEST REPORT

August 14, 2013

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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Page 8

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IESNA LM79-2008 TEST REPORT

Report# JI308097-1-LM79

August 14, 2013

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	11/17/2013
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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Page 9

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