



8165 E Kaiser Blvd. Anaheim, CA 92808
p. 714.282.2270
f. 714.676.5558

Test #: L01145301

Date: 1/17/2014



NVLAP LAB CODE 200927-0

Test Report: L01145301

Model Number: ZXL-SLS-M

Report Prepared For: HK Lighting Group
3529 Old Conejo Road, Unit 118

Test: Electrical and Photometric tests as required by the IESNA test standards.

Standards Used: Appropriate part or all test guidelines were used for test performed:

IESNA LM79: 2008 Approved Methods for Electrical and Photometric Measurements of Solid-State Lighting Products

ANSI NEMA ANSLG C78.377: 2008 Specification of the Chromaticity of Solid State Lighting Products

ANSI C82.77:2002: Harmonic Emission Limits-Related Quality Requirements for Lighting Equipment

Description of Sample: Client submitted the sample. Fixture catalog number is ZXL-SLS-M. Received in working and undamaged condition. No modifications were necessary.

Testing Condition: Fixture is tested with no special conditions.

Sample Arrival Date: 1/15/14

Date of Tests: 1/16/14 - 1/16/14

Seasoning of Sample SSL: No seasoning was performed in accordance with IESNA LM-79.

Equipment List

Equipment Used	Model No	Stock No	Calibration Due Date
Chroma Programmable AC Source	61604	PS-AC02	--
Yokogawa Digital Power Meter	WT210	MT-EL06-S1	01/04/15
Xitron Power Analysis System	2503AH	MT-EL01	01/09/15
Fluke Digital Thermometer	52k/J	MT-TP02-GC	01/04/15
LLI Type C Goniophotometer System	RMG-C-MKII	CD-LL04-GC	--
LLI 2M Sphere	2MR97	CD-SN03-S2	--
LLI Spectroradiometer	SPR-3000	MT-SC01-S2	Before Use

*All Results in accordance to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.

LM-79 Test Summary

Manufacturer:	HK Lightng Group
Model Number:	ZXL-SLS-M
LAMPCAT:	N/A
Driver Model Number:	N/A
Total Lumens:	80.90
Input Voltage (VAC/60Hz):	12.00
Input Current (Amp):	0.58
Input Power (W):	4.48
Input Power Factor:	0.64
Total Harmonic Distortion @ 12V(%):	94%
Total Harmonic Distortion @ 277V(%):	N/A
Efficacy:	18
Color Rendering Index (CRI):	88
Correlated Color Temperature (K):	2951
Chromaticity Coordinate x:	0.4396
Chromaticity Coordinate y:	0.4036
Ambient Temperature (°F):	77.0
Stabilization Time (Hours):	0:35
Total Operating Time (Hours):	1:20
Off State Power(W):	0.00

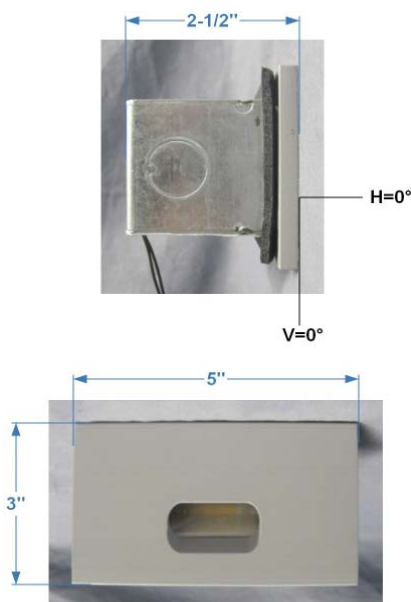
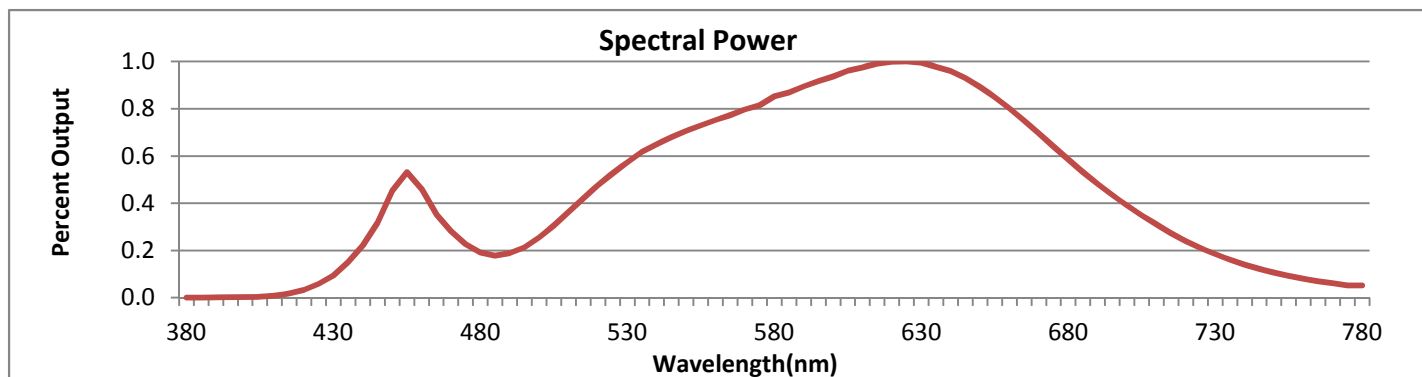


FIG.1 LUMINAIRE



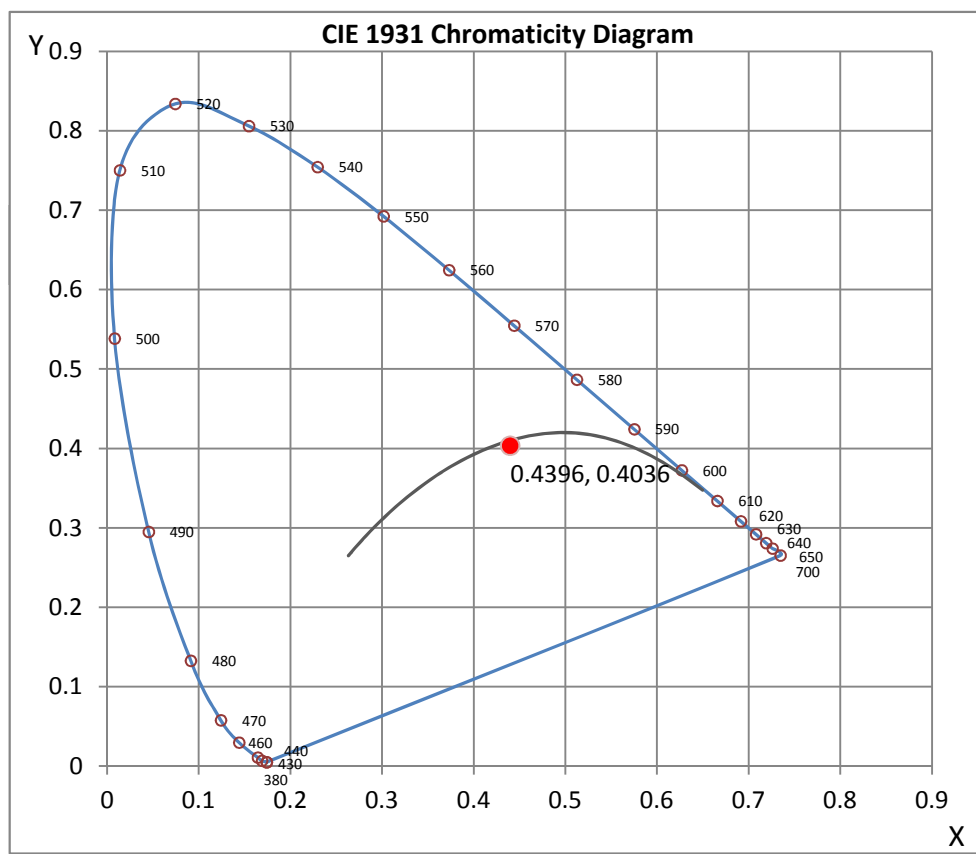
Wavelength	W/m ² nm	440	0.0003	510	0.0004	580	0.0010	650	0.0010	720	0.0003
380	0.0000	450	0.0005	520	0.0005	590	0.0010	660	0.0009	730	0.0002
390	0.0000	460	0.0005	530	0.0007	600	0.0011	670	0.0008	740	0.0002
400	0.0000	470	0.0003	540	0.0007	610	0.0011	680	0.0007	750	0.0001
410	0.0000	480	0.0002	550	0.0008	620	0.0011	690	0.0006	760	0.0001
420	0.0000	490	0.0002	560	0.0009	630	0.0011	700	0.0004	770	0.0001
430	0.0001	500	0.0003	570	0.0009	640	0.0011	710	0.0004	780	0.0001

CRI & CCT

x	0.4396
y	0.4036
u'	0.2525
v'	0.5216
CRI	87.90
CCT	2951
Duv	-0.00054

R Values

R1	87.93
R2	91.62
R3	92.10
R4	86.81
R5	85.63
R6	86.72
R7	92.07
R8	80.05
R9	53.27
R10	77.60
R11	83.65
R12	67.04
R13	88.50
R14	94.53





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Test Methods

Photometric Measurements - Goniophotometer

A Custom Light Laboratory Type C Rotating Mirror Goniophotometer was used to measure candelas(intensity) at each angle of distribution as defined by IESNA for the appropriate fixture type.

Ambient temperature is set to 25°C and is measured from the center of the fixture, within 1ft from the outside of the fixture. Temperature is maintained at 25°C throughout the testing process and the sample is stabilized for at least 30mins and longer as necessary for the sample to achieve stabilization.

Electrical measurements are measured using the listed equipment.

Spectral Measurements - Integrating Sphere

A Sensing Spectroradiometer SPR-3000, in conjunction with Light Laboratory 2 meter integrating sphere was used to measure chromaticity coordinates, correlated color temperature(CCT) and the color rendering index(CRI) for each sample.

Ambient temperature is set to 25°C and is measured from the center of the fixture, within 1ft from the outside of the fixture. Temperature is maintained at 25°C throughout the testing process and the sample is stabilized for at least 30mins and longer as necessary for the sample to achieve stabilization.

Electrical measurements are measured using the listed equipment.

Disclaimers:

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

Report Prepared by : THI NGUYEN

Test Report Released by:

Jeff Ahn
Engineering Manager

Test Report Reviewed by:

Steve Kang
Quality Assurance

**Attached are photometric data reports. Total number of pages: 13*

**All Results in accordance to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.*



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Photometric Test Report

IES ROAD REPORT

PHOTOMETRIC FILENAME : L01145301.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002
[TEST] L01145301
[TESTLAB] LIGHT LABORATORY, INC.
[ISSUEDATE] 01/21/2014
[MANUFAC] HK LIGHTING GROUP
[LUMCAT] ZXL-SLS-M
[LUMINAIRE] 2-1/2"L. X 5"W. X 3"H. LED FIXTURE
[MORE] CLEAR LENS
[LAMPPOSITION] 0,0
[LAMPCAT] N/A
[OTHER] INDICATING THE CANDELA VALUES ARE ABSOLUTE AND
[MORE] SHOULD NOT BE FACTORED FOR DIFFERENT LAMP RATINGS.
[INPUT] 12VAC, 4.48W
[TEST PROCEDURE] IESNA:LM-79-08

CHARACTERISTICS

IES Classification	Type II
Longitudinal Classification	Very Short
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	81
Downward Total Efficiency	N.A. (absolute)
Total Luminaire Efficiency	N.A. (absolute)
Luminaire Efficacy Rating (LER)	18
Total Luminaire Watts	4.48
Ballast Factor	1.00
Upward Waste Light Ratio	0.13
Maximum Candela	91
Maximum Candela Angle	0H 35V
Maximum Candela (<90 Degrees Vertical)	91
Maximum Candela Angle (<90 Degrees Vertical)	0H 35V
Maximum Candela At 90 Degrees Vertical	27.52 (34.0% Luminaire Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	29.51 (36.4% Luminaire Lumens)
Cutoff Classification (deprecated)	N.A. (absolute)

IES ROAD REPORT
PHOTOMETRIC FILENAME : L01145301.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS)

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	5.7	N.A.	7.1
FM - Front-Medium (30-60)	47.4	N.A.	58.5
FH - Front-High (60-80)	11.5	N.A.	14.3
FVH - Front-Very High (80-90)	5.7	N.A.	7.0
BL - Back-Low (0-30)	0.0	N.A.	0.0
BM - Back-Medium (30-60)	0.0	N.A.	0.0
BH - Back-High (60-80)	< 0.05	N.A.	0.0
BVH - Back-Very High (80-90)	< 0.05	N.A.	0.0
UL - Uplight-Low (90-100)	4.6	N.A.	5.6
UH - Uplight-High (100-180)	6.0	N.A.	7.4
Total	80.9	N.A.	100.0
BUG Rating	B0-U1-G0		

IES ROAD REPORT
PHOTOMETRIC FILENAME : L01145301.IES

CANDELA TABULATION

Vert. Angles	Horizontal Angles									
	0	5	10	15	20	25	30	35	40	45
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.66	0.67	0.68	0.66	0.65	0.63	0.61	0.58	0.55	0.51
10	2.16	2.14	2.08	2.02	1.93	1.83	1.71	1.59	1.45	1.29
15	4.14	4.12	4.01	3.87	3.70	3.53	3.30	3.02	2.69	2.29
20	7.13	7.19	7.05	6.90	6.79	6.50	6.06	5.43	4.47	3.82
25	74.92	73.55	69.44	62.77	53.60	42.13	28.65	13.33	9.77	8.19
30	88.52	88.08	86.95	85.14	82.75	79.84	76.23	63.74	43.77	23.93
35	91.00	90.75	90.10	89.16	87.80	86.76	85.64	79.38	71.22	55.22
40	85.53	85.46	85.45	85.35	85.00	84.25	82.93	81.45	76.39	64.62
45	85.20	84.96	84.46	83.47	81.89	79.99	78.76	76.41	70.89	63.90
50	83.21	82.96	81.40	79.40	78.60	78.68	75.60	71.91	64.53	56.33
55	35.64	35.80	39.48	48.45	56.14	54.74	64.54	59.00	56.54	49.67
60	15.08	16.43	17.90	16.68	16.77	19.60	22.35	26.58	32.60	33.58
65	21.55	21.49	20.79	19.08	17.14	13.43	10.88	8.96	8.39	9.93
70	29.01	28.31	26.97	26.45	23.04	19.12	14.40	9.64	5.74	3.29
75	29.51	29.34	28.77	27.55	25.26	21.11	16.33	11.33	6.58	3.17
80	29.51	29.25	28.74	27.58	25.08	21.02	16.30	11.35	6.60	3.02
85	29.01	28.78	28.30	27.15	24.80	20.50	15.80	10.95	6.27	2.79
90	27.52	27.43	26.94	25.86	23.12	18.98	14.50	9.86	5.39	2.49
95	24.70	24.05	23.65	22.39	19.67	15.95	11.95	7.93	4.42	2.38
100	17.90	18.04	17.48	16.34	14.36	11.71	8.87	6.15	3.72	2.32
105	13.59	13.57	13.23	12.37	10.95	9.10	7.03	4.96	3.24	2.20
110	10.44	10.41	10.15	9.50	8.43	7.00	5.46	3.91	2.70	1.96
115	7.79	7.75	7.42	6.95	6.20	5.06	4.05	3.07	2.26	1.73
120	5.30	5.29	5.16	4.81	4.26	3.62	2.97	2.36	1.92	1.59
125	3.65	3.59	3.52	3.36	3.00	2.69	2.27	1.95	1.67	1.44
130	2.65	2.62	2.56	2.49	2.30	2.09	1.90	1.67	1.47	1.30
135	1.99	1.98	2.00	1.96	1.82	1.70	1.59	1.44	1.30	1.16
140	1.66	1.65	1.61	1.55	1.48	1.43	1.35	1.25	1.14	1.06
145	1.33	1.32	1.31	1.28	1.25	1.21	1.15	1.10	1.03	0.96
150	1.16	1.16	1.14	1.12	1.10	1.06	1.02	0.97	0.91	0.85
155	1.00	0.99	0.98	0.97	0.94	0.91	0.88	0.84	0.76	0.68
160	0.83	0.83	0.81	0.78	0.75	0.70	0.65	0.58	0.51	0.46
165	0.50	0.50	0.49	0.48	0.47	0.45	0.43	0.41	0.38	0.35
170	0.33	0.33	0.33	0.32	0.31	0.30	0.29	0.27	0.25	0.23
175	0.17	0.17	0.17	0.16	0.16	0.15	0.14	0.14	0.13	0.12
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Vert. Angles	Horizontal Angles									
	50	55	60	65	70	75	80	85	90	95
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.47	0.42	0.37	0.31	0.25	0.19	0.13	0.07	0.00	0.00
10	1.12	0.94	0.75	0.63	0.51	0.39	0.26	0.13	0.00	0.00
15	1.91	1.62	1.32	1.01	0.70	0.52	0.34	0.17	0.00	0.00
20	3.19	2.50	1.83	1.43	1.03	0.61	0.40	0.20	0.00	0.00
25	5.61	3.67	2.80	1.91	1.36	0.88	0.49	0.25	0.00	0.00
30	14.56	9.12	3.67	2.64	1.65	1.11	0.58	0.29	0.00	0.00
35	34.25	18.67	9.62	3.26	2.17	1.32	0.67	0.29	0.00	0.00
40	50.92	31.36	16.43	5.99	2.55	1.44	0.78	0.32	0.00	0.00
45	51.97	38.55	21.12	9.68	2.81	1.61	0.88	0.35	0.00	0.00
50	47.72	37.26	23.04	10.19	3.17	1.71	0.90	0.38	0.00	0.00
55	40.94	31.52	21.01	8.42	3.48	1.63	0.92	0.41	0.00	0.00

IES ROAD REPORT
PHOTOMETRIC FILENAME : L01145301.IES

CANDELA TABULATION - (Cont.)

60	32.07	25.76	16.05	6.80	2.50	1.36	0.85	0.36	0.00	0.00
65	14.58	14.37	9.68	4.19	1.59	1.25	0.89	0.38	0.08	0.00
70	2.69	3.37	3.29	1.91	1.26	1.13	0.86	0.40	0.08	0.00
75	1.85	1.52	1.34	1.25	1.17	1.13	0.87	0.33	0.08	0.00
80	1.83	1.55	1.32	1.24	1.16	1.08	0.90	0.33	0.08	0.00
85	1.82	1.57	1.39	1.24	1.16	1.08	0.75	0.25	0.08	0.00
90	1.91	1.58	1.33	1.24	1.16	1.00	0.75	0.25	0.08	0.00
95	1.89	1.57	1.39	1.23	1.07	0.91	0.58	0.25	0.08	0.00
100	1.86	1.55	1.31	1.15	0.99	0.89	0.57	0.25	0.08	0.00
105	1.80	1.51	1.29	1.13	0.96	0.73	0.56	0.24	0.08	0.00
110	1.60	1.42	1.24	1.08	0.92	0.71	0.53	0.23	0.00	0.00
115	1.50	1.31	1.15	1.00	0.85	0.65	0.37	0.15	0.00	0.00
120	1.36	1.23	1.05	0.92	0.79	0.60	0.35	0.14	0.00	0.00
125	1.25	1.10	0.97	0.84	0.71	0.53	0.32	0.14	0.00	0.00
130	1.14	1.03	0.91	0.79	0.67	0.49	0.30	0.13	0.00	0.00
135	1.06	0.96	0.85	0.72	0.59	0.44	0.27	0.12	0.00	0.00
140	0.98	0.88	0.77	0.62	0.50	0.39	0.24	0.11	0.00	0.00
145	0.88	0.79	0.66	0.55	0.46	0.34	0.20	0.10	0.00	0.00
150	0.77	0.66	0.56	0.47	0.38	0.28	0.17	0.08	0.00	0.00
155	0.61	0.53	0.44	0.35	0.28	0.21	0.14	0.07	0.00	0.00
160	0.43	0.38	0.33	0.28	0.22	0.17	0.11	0.06	0.00	0.00
165	0.32	0.28	0.25	0.21	0.17	0.13	0.09	0.04	0.00	0.00
170	0.21	0.19	0.17	0.14	0.11	0.09	0.06	0.03	0.00	0.00
175	0.11	0.10	0.08	0.07	0.06	0.04	0.03	0.01	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Vert. Angles **Horizontal Angles**

	<u>100</u>	<u>105</u>	<u>110</u>	<u>115</u>	<u>120</u>	<u>125</u>	<u>130</u>	<u>135</u>	<u>140</u>	<u>145</u>
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

IES ROAD REPORT
PHOTOMETRIC FILENAME : L01145301.IES

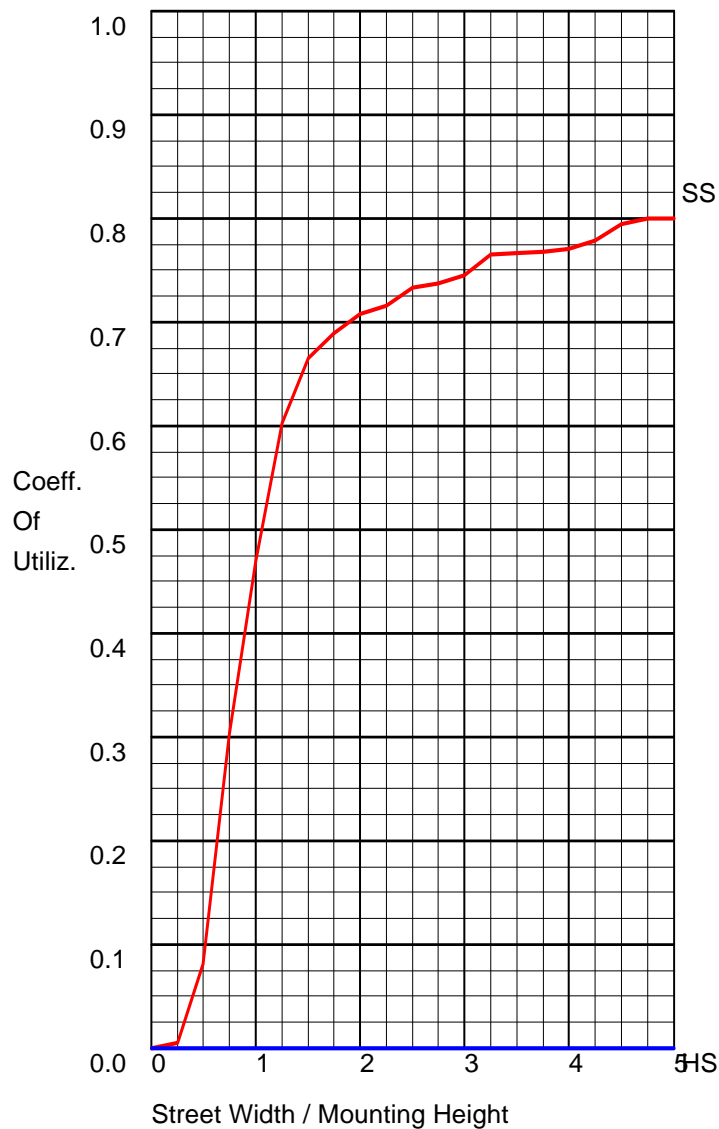
CANDELA TABULATION - (Cont.)

135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Vert. Horizontal Angles

Angles	<u>150</u>	<u>155</u>	<u>160</u>	<u>165</u>	<u>170</u>	<u>175</u>	<u>180</u>
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00

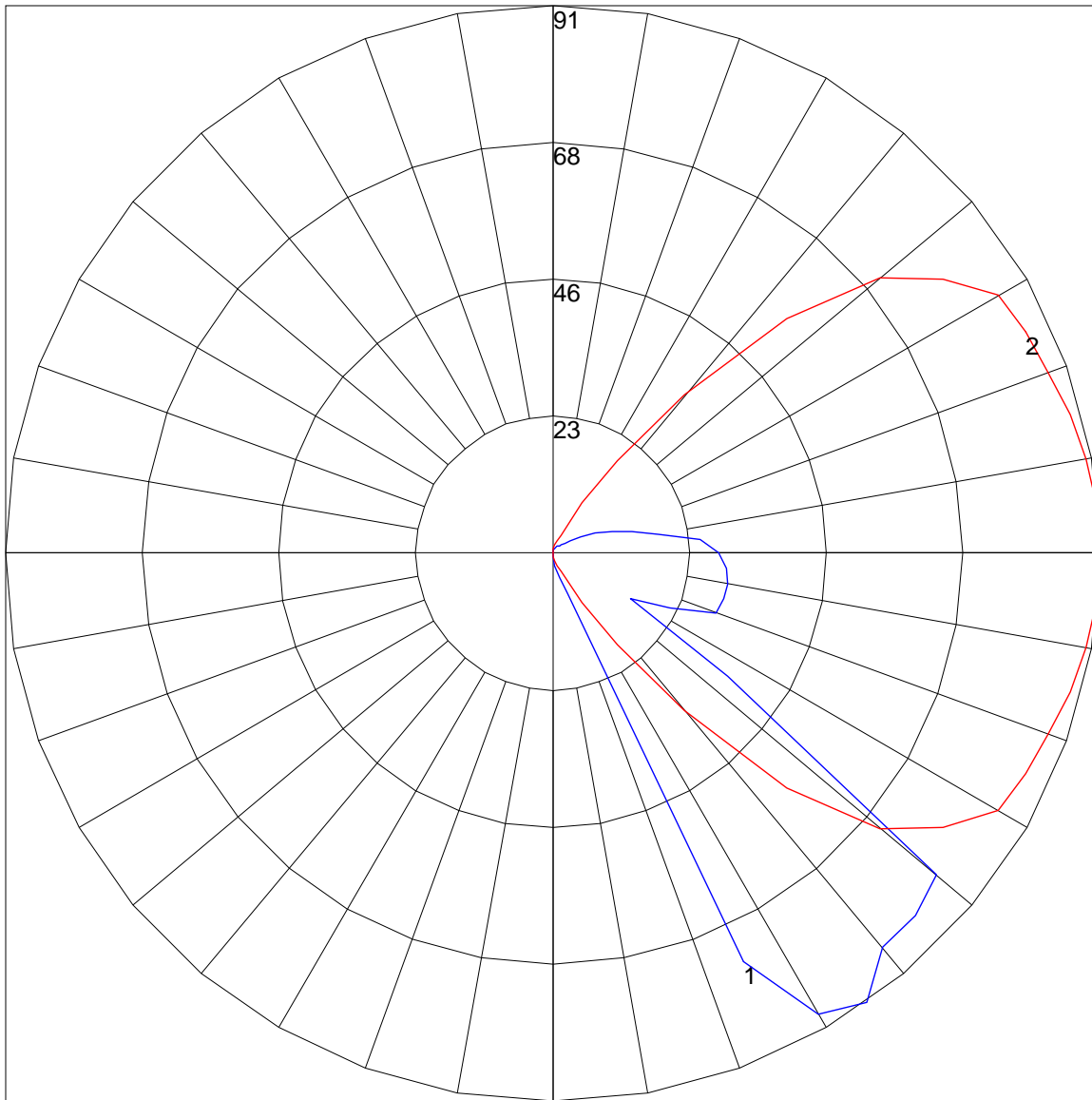
COEFFICIENTS OF UTILIZATION



FLUX DISTRIBUTION

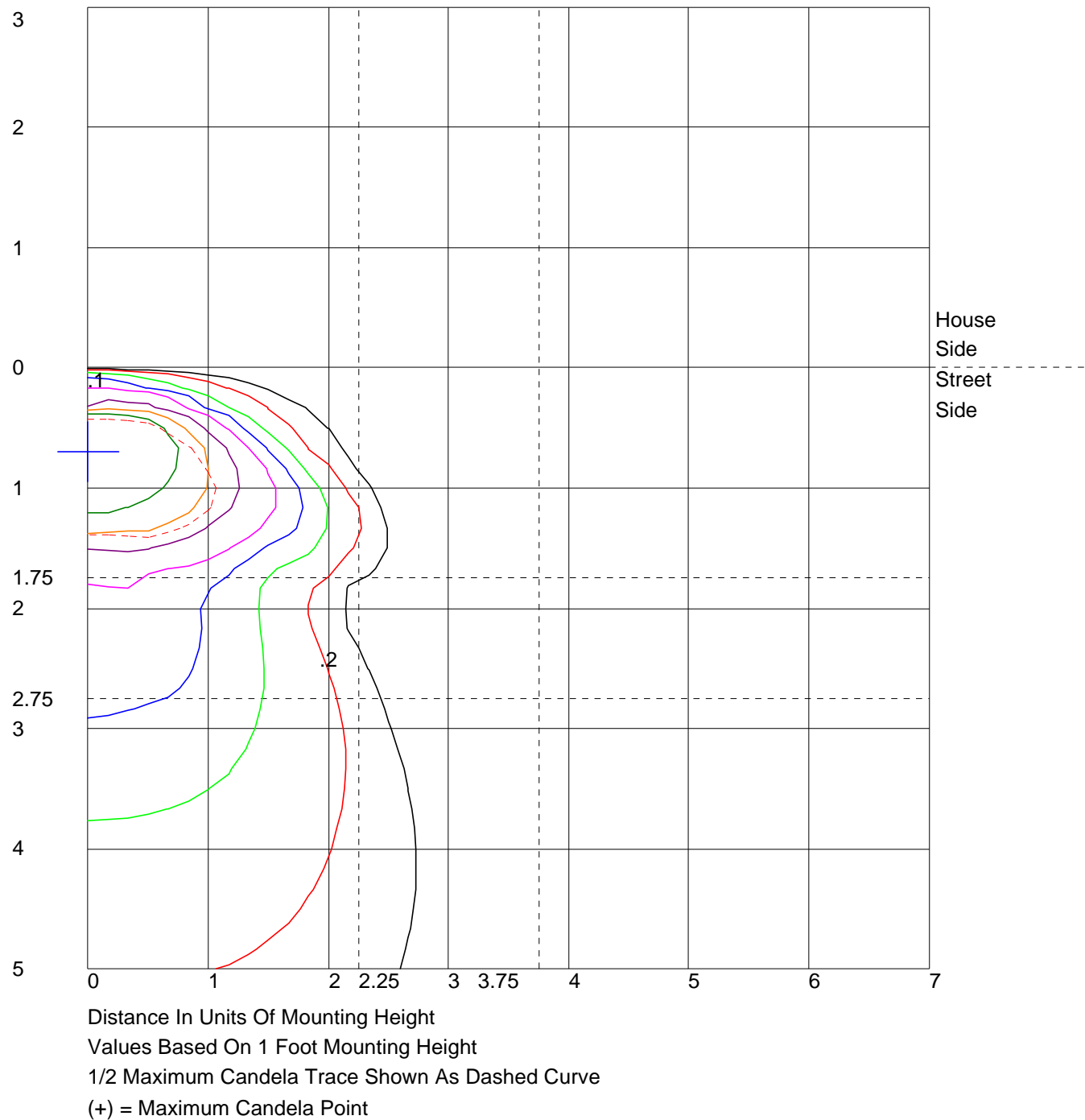
	Lumens	Percent Of Luminaire
Downward Street Side	70.3	86.9
Downward House Side	0.0	0.0
Downward Total	70.3	86.9
Upward Street Side	10.6	13.1
Upward House Side	0.0	0.0
Upward Total	10.6	13.1
Total Flux	80.9	100.0

POLAR GRAPH

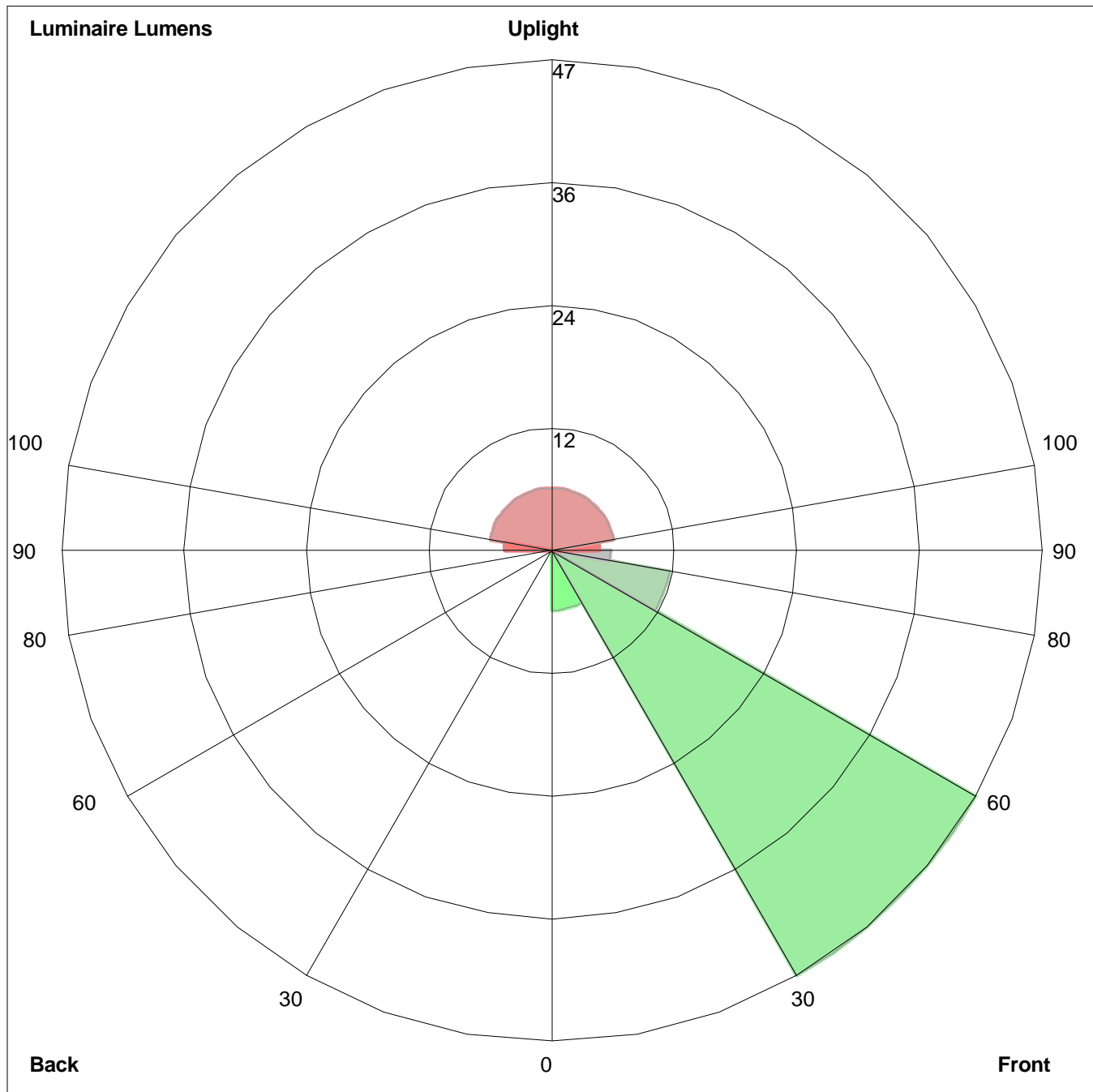


Maximum Candela = 91 Located At Horizontal Angle = 0, Vertical Angle = 35
1 - Vertical Plane Through Horizontal Angles (0 - 180) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (35) (Through Max. Cd.)

ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE



LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=5.7, Medium=47.4, High=11.5, Very High=5.7
Back: Low=0.0, Medium=0.0, High=0.0, Very High=0.0
Uplight: Low=4.6, High=6.0

BUG Rating : B0-U1-G0