



PHOTOMETRIC TESTING & EVALUATION TO IES LM-79-08

Sample Tested
WL-LED-12W-NW-WHT

Prepared for:

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Program Description

Photometric and electrical testing of a “WL-LED-12W-NW-WHT” Roadway Style Luminaire to IES LM-79-08.

Executive Summary

Sample Tested = **WL-LED-12W-NW-WHT**

Luminous Efficacy (Lumens/Watt)	Luminous Flux (Lumens)	Input Power (Watts)	Power Factor
78.5	1034.8	13.19	0.973

CCT (K)*	CRI*	Stabilization Time (Light & Power)
3991	66.9	60 minutes

* The above results are recorded / derived from measurements made using an Integrating Sphere

Roadway Summary [‡] - Utilization		
Downward Utilization		Percentage Luminaire
Street Side Lumens	577.7	55.8%
House Side Lumens	457.1	44.2%
Total	1034.8	100.0%
Upward Utilization		0.0 Lumen / 0.0% (No Uplight)
IES Classification		Type II – Very Short

[‡] Based upon IES file generated output



TABLE OF CONTENTS

Sample	4
Test Results	5
Spectral Flux	6
Chromaticity Diagram	7
Flux Distribution – Zonal Lumen Summary	8
Illuminance Plots	9
Candela Plots	10
Candela Tabulation	11
Photometric Testing Information	16
Equipment List:	16

September 14 , 2011

Sample

The following sample was submitted for evaluation:

RAB Design Lighting Inc.: **WL-LED-12W-NW-WHT**

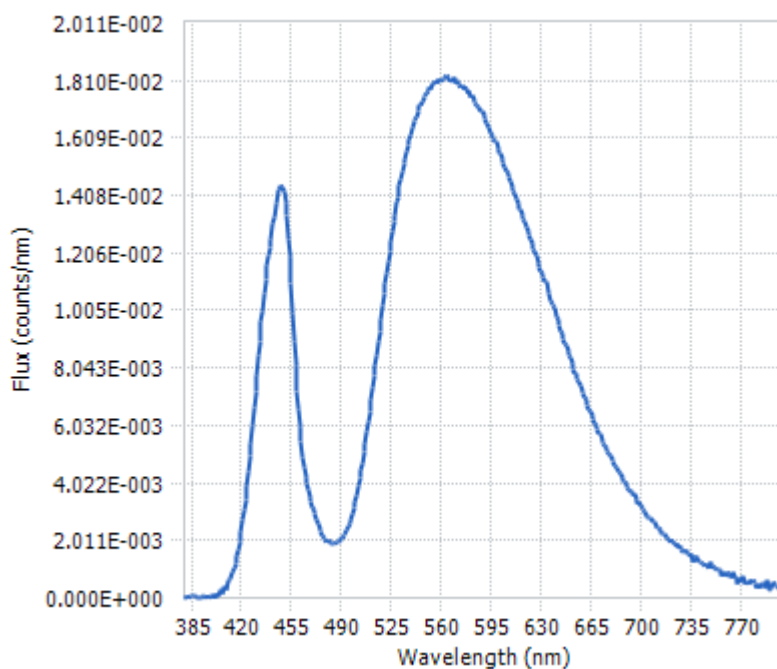


Model# WL-LED-12W-NW-WHT

Test Results –	
The following results were measured after stabilization of the sample. Stability is reached when the variation of 3 readings of light output and electrical power, taken 15 minutes apart, is less than 0.50% (in accordance with IES LM-79-08).	
Key Photometric Results	Sample Reference
	WL-LED-12W-NW-WHT
Luminous Efficacy (Lumens/Watt)	78.5
Total Luminous Flux (Lumens)	1034.8
Total Radiant Flux (Watts)	2.992
Correlated Color Temperature (CCT)	3991
Color Rendering Index (CRI)	66.9
R9 Value	-31.4
Chromaticity (Chroma x / Chroma y)	0.3873 / 0.4009
Chromaticity (Chroma u / Chroma v)	0.2201 / 0.3419
Chromaticity (Chroma u' / Chroma v')	0.2201 / 0.5128
D _{uv} Value	0.0090
Stabilization Time (Light and Power)	Approx. 60 minutes
Total Run Time – Integrating Sphere	NA
Total Run Time – Goniophotometer	75 minutes
IES Classification	Type II – Very Short
Electrical Input Results:	Sample Reference
	WL-LED-12W-NW-WHT
Input Power (Watts)	13.19
Input Voltage (Volts AC)	120.0
Input Current (Amps)	0.113
Input Frequency (Hertz)	60.0
Power Factor	0.973
Additional Information	Sample Reference
	WL-LED-12W-NW-WHT
Ambient Temperature	25°C
Integrating Sphere Detector	Ocean Optics S2000 Spectroradiometer
Absorption Correction used?	Yes

Spectral Flux

The following graph shows the spectral response curve of the radiant flux for the sample:

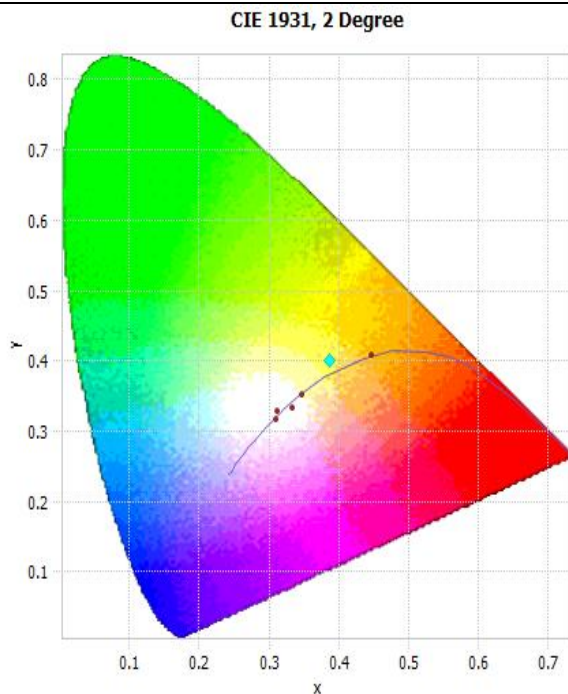


Spectral response of the Radiant Flux
(380nm to 800nm – calibrated range of the Spectroradiometer).

September 14 , 2011

Chromaticity Diagram

The following image shows the chromaticity diagram for the sample:



Tristimulus values (from page 5):

$x / y = 0.3873 / 0.4009$

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



September 14 , 2011

Test Results – Flux Distribution – Zonal Lumen Summary

The following table depicts the zonal lumen distribution for the sample:

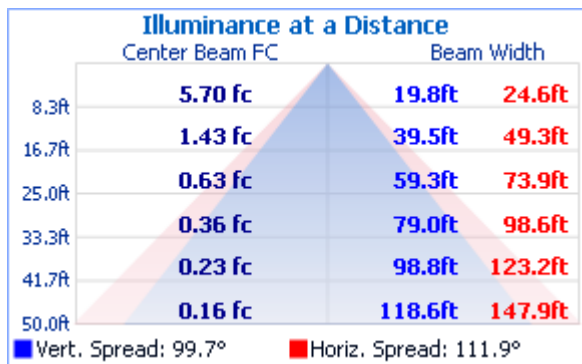
Zone	Lumens	% Total
0 - 10	37.9	3.7%
10 - 20	110.5	10.7%
20 - 30	170.1	16.4%
30 - 40	207.1	20.0%
40 - 50	194.5	18.8%
50 - 60	162.1	15.7%
60 - 70	113.5	11.0%
70 - 80	31.6	3.1%
80 - 90	7.6	0.7%
90 - 100	0	0%
100 - 110	0	0%
110 - 120	0	0%
120 - 130	0	0%
130 - 140	0	0%
140 - 150	0	0%
150 - 160	0	0%
160 - 170	0	0%
170 - 180	0	0%
Total	Lumens	100%

Zonal Lumen Summary

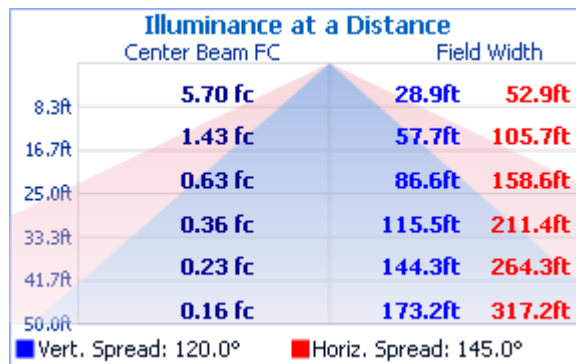
Zone	Lumens	% Lamp / Luminaire
0 - 60	882.1	85.2%
60 - 90	152.6	14.8%
0 - 90	1034.8	100.0%
90 - 180	0.0	0.0%
0 - 180	1034.8	100.0%

Test Results – Illuminance Plots

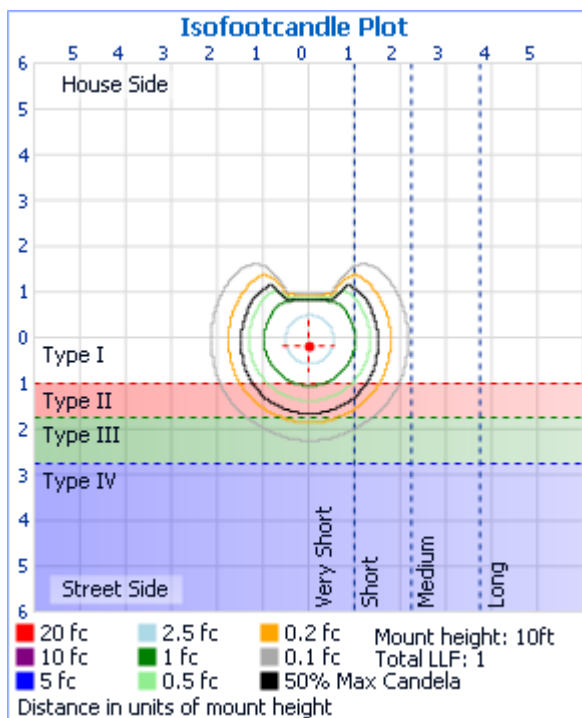
The following images depict the illuminance characteristics of the luminaire.



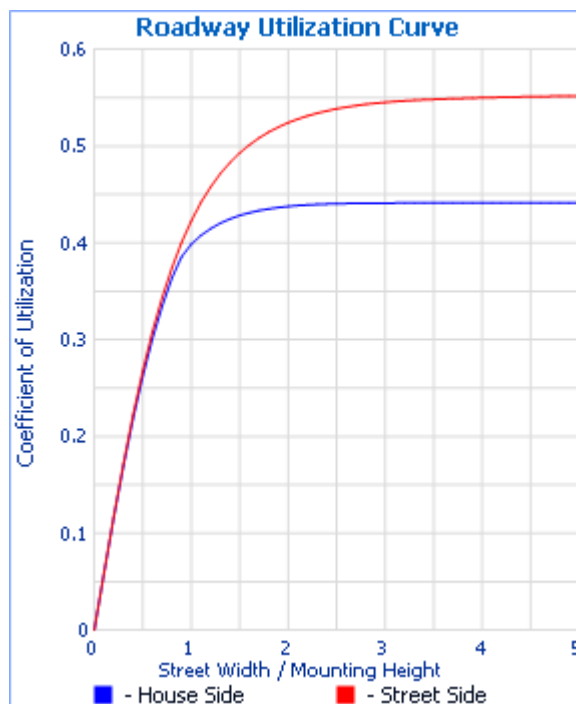
Beam Angle



Field Angle



Illuminance Plot (Footcandles)

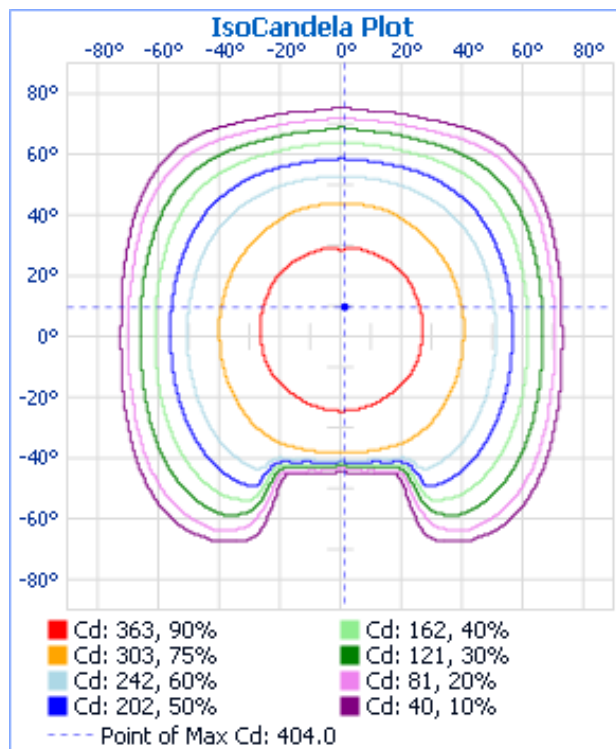


Roadway Utilization Curve

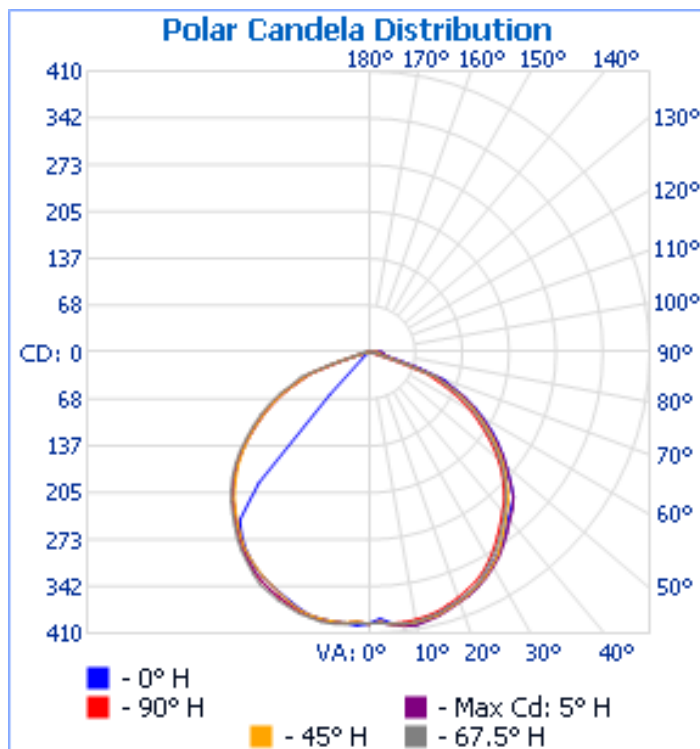
September 14 , 2011

Test Results – Candela Plots

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



Isocandela Plot



Polar Candela Distribution



September 14 , 2011

Test Results – Candela Tabulation

The following table provides the tabulated Candela measurements:

	0	5	15	25	35	45	55	60	62.5	65	67.5	70	72.5	75	77.5	80	82.5	85	87.5	90
0	396	396	396	396	396	396	396	396	396	396	396	396	396	396	396	396	396	396	396	396
2.5	389	395	395	395	395	394	394	394	395	395	395	395	395	394	394	394	394	394	394	394
5	397	399	399	399	399	398	398	398	398	398	398	398	398	398	398	398	398	397	397	397
7.5	400	403	402	401	401	400	400	400	400	400	399	399	399	399	399	398	398	398	397	397
10	403	404	403	402	401	400	399	399	399	399	399	399	398	398	398	397	397	397	396	396
12.5	399	401	401	400	399	398	398	397	397	397	396	396	396	396	395	395	394	394	394	394
15	395	398	398	397	396	396	395	394	394	394	394	393	393	393	392	392	391	391	391	391
17.5	390	393	393	393	392	391	390	390	390	390	389	389	389	388	388	387	387	386	386	386
20	386	388	388	388	388	387	386	386	385	385	385	384	384	384	383	383	382	382	381	381
22.5	382	384	384	383	383	382	380	380	380	379	379	379	379	378	378	377	377	377	376	375
25	377	378	378	377	377	376	374	374	374	374	374	373	373	372	371	371	370	370	370	369
27.5	368	371	371	370	370	369	367	366	365	365	364	364	364	364	363	362	362	362	361	361
30	359	363	363	361	361	360	357	356	355	355	354	354	353	353	352	352	351	351	351	351
32.5	350	354	354	353	352	351	347	345	345	344	344	343	343	342	342	341	341	340	341	340
35	341	343	344	343	343	338	335	334	334	333	333	332	332	331	331	331	330	330	329	328
37.5	329	332	332	331	330	325	323	322	321	321	320	320	319	319	319	318	318	317	317	316
40	317	320	320	319	317	312	310	309	309	308	308	307	307	306	306	306	306	306	305	304
42.5	308	311	310	308	304	301	298	298	297	296	296	295	295	295	294	294	294	294	294	293
45	299	299	300	297	290	287	285	284	284	283	283	282	282	282	281	281	280	280	280	279
47.5	281	281	282	283	275	272	271	270	270	269	269	268	268	267	267	266	265	265	265	265
50	263	263	263	263	260	258	256	255	254	254	253	253	252	251	251	250	250	249	249	249
52.5	247	247	246	245	243	241	239	238	237	237	236	235	233	233	233	232	232	232	232	231
55	230	229	228	227	225	223	221	219	219	218	217	216	215	214	214	214	213	213	213	212
57.5	213	210	209	209	209	205	204	201	201	200	199	198	197	197	196	195	195	195	194	193
60	194	192	191	190	190	187	185	183	182	181	181	180	179	178	177	176	176	175	174	174
62.5	176	173	172	169	170	169	168	166	165	163	163	163	161	160	158	157	156	156	154	154
65	156	154	151	147	146	148	148	146	145	144	143	141	140	140	138	137	136	134	133	133
67.5	133	130	126	122	121	122	121	121	120	119	118	117	116	115	114	113	112	111	110	109
70	118	111	108	104	97	104	104	104	105	104	105	105	101	97	93	91	90	90	91	90
72.5	78	74	66	59	57	59	68	63	62	59	57	56	55	54	52	49	47	45	43	43
75	48	40	36	33	31	34	29	27	27	27	25	24	22	21	19	18	17	16	15	15
77.5	29	28	27	25	23	22	19	17	16	16	15	14	13	12	11	10	9	9	8	8
80	25	24	23	22	20	18	15	14	13	12	11	10	9	8	7	6	5	4	4	4
82.5	23	22	21	20	18	16	13	12	11	10	9	8	7	6	5	4	3	2	2	2
85	21	21	20	19	17	15	12	10	10	9	8	7	6	5	4	3	2	2	1	1
87.5	20	20	19	18	16	14	11	9	9	8	7	6	5	4	3	2	2	1	0	0
90	19	19	18	17	15	13	10	9	8	7	6	5	4	4	3	2	1	0	0	0

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September 14 , 2011

Test Results – Candela Tabulation Cont.

	90	95	105	115	125	135	145	155	165	175	180
0	396	396	396	396	396	396	396	396	396	396	396
2.5	394	394	394	394	394	393	394	393	393	394	399
5	397	397	397	397	397	396	396	395	395	395	396
7.5	397	397	397	397	397	396	396	395	395	396	396
10	396	396	396	395	395	395	395	394	394	396	395
12.5	394	394	393	393	393	393	393	393	392	393	393
15	391	390	389	389	389	389	389	388	387	387	387
17.5	386	385	384	384	384	382	382	380	379	379	380
20	381	380	379	379	378	375	374	374	373	373	374
22.5	375	375	374	373	371	368	368	368	368	368	368
25	369	368	367	366	363	362	361	361	362	361	362
27.5	361	360	360	357	355	354	354	354	354	354	355
30	351	350	350	347	346	346	346	346	346	345	346
32.5	340	340	339	337	337	337	337	337	337	336	336
35	328	328	328	326	326	326	326	326	325	324	323
37.5	316	316	314	313	314	314	313	312	310	308	308
40	304	303	302	301	302	302	301	297	288	273	249
42.5	293	292	290	289	290	290	289	263	175	122	84
45	279	279	276	276	276	276	274	136	38	19	13
47.5	265	264	261	261	262	261	257	33	10	7	6
50	249	248	246	246	247	246	240	17	5	3	2
52.5	231	230	229	229	230	229	222	11	2	0	0
55	212	211	210	211	212	211	204	8	0	0	0
57.5	193	192	191	192	193	192	184	7	0	0	0
60	174	173	172	172	173	173	154	6	0	0	0
62.5	154	153	154	154	156	154	124	5	0	0	0
65	133	133	135	135	136	133	104	4	0	0	0
67.5	109	108	109	111	111	109	78	3	0	0	0
70	90	88	89	95	92	90	50	2	0	0	0
72.5	43	43	46	51	57	45	21	1	0	0	0
75	15	14	14	19	18	15	6	0	0	0	0
77.5	8	7	7	6	6	6	2	0	0	0	0
80	4	3	3	3	3	2	1	0	0	0	0
82.5	2	2	2	1	1	1	0	0	0	0	0
85	1	1	0	0	0	0	0	0	0	0	0
87.5	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0

Continued.....



September 14 , 2011

Test Results – Candela Tabulation Cont.

	0	5	15	25	35	45	55	60	62.5	65	67.5	70	72.5	75	77.5	80	82.5	85	87.5	90
92.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
112.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
137.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
142.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
147.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
167.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
172.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	0	0	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	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Continued.....



September 14 , 2011

Test Results – Candela Tabulation Cont.

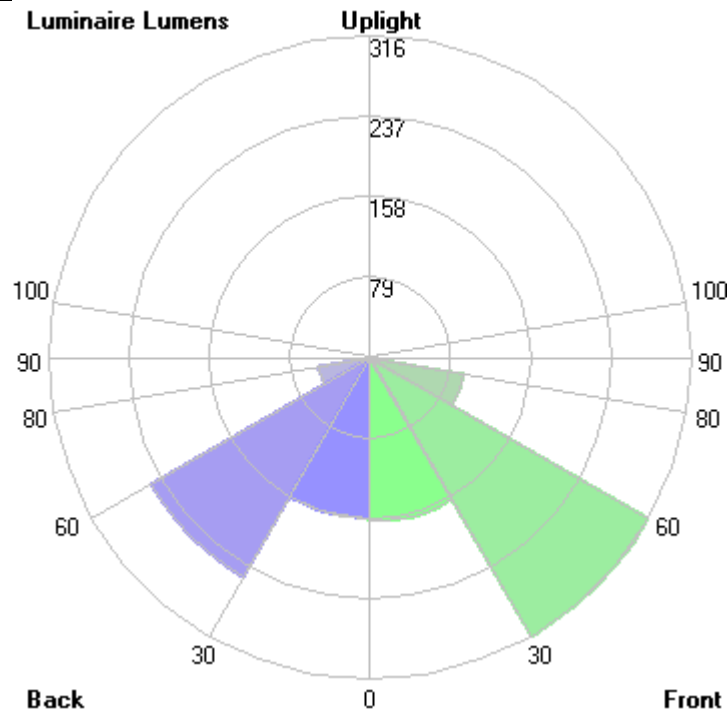
	90	95	105	115	125	135	145	155	165	175	180
92.5	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0
107.5	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0
112.5	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0
117.5	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0
122.5	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0
127.5	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0
132.5	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0
137.5	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0
142.5	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0
147.5	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0
152.5	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0
157.5	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0
162.5	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0
167.5	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0
172.5	0	0	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0
177.5	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0

Test Results – BUG Rating Analysis

The following table shows the BUG rating classification:

Luminaire Classification System (LCS)			
LCS	Zone	Lumens	% of Luminaire
FL	0 – 30	161.2	15.6
FM	30 – 60	315.8	30.5
FH	60 – 80	93.6	9.0
FVH	80 – 90	7.3	0.7
BL	0 – 30	157.4	15.2
BM	30 – 60	248.0	24.0
BH	60 – 80	51.6	5.0
BVH	80 – 90	0.2	0.0
UL	90 – 100	0.0	0.0
UH	100 - 180	0.0	0.0
Total		1034.8	100.0

BUG RATING = B1-U1-G0



Photometric Testing Information

The sample was evaluated for photometric and electrical characteristics using a goniophotometer, located in purpose-built, temperature and humidity-controlled, draft free environments.

The spectroradiometer is an array-type detector manufactured by Ocean Optics (Model# S2000).

Luminaire Stabilization.

The sample was powered by a regulated and conditioned 120.0 Volt, alternating current supply. The light output was monitored and the testing was started after three consecutive readings every 15 minutes varied no more that 0.5%.

CSA is an accredited Test Laboratory (TL-430)
to IESNA LM79-08 by IAS
(International Accreditation Service)



Equipment List:

Description	Manufacturer and Model Number	CSA Instrument Reference Number	Calibration Due Date
Gonio-photometer	LSI LSC	LSC	4-24-2012
Spectroradiometer	Ocean Optics S2000	S2000	5-20-2012
Power Analyzer	Yokogawa WT210	PA301	5-29-2012