



NVLAP Lab Code 500089-0

**Report Number:** PL05698-001A  
**Model:** PWY-EDG-3M-xx-02-E-UL-350-40K /  
BXBPx318E-UH7  
**Date:** 03/23/2015

## Cree Racine Engineering Services Testing Laboratory (RESTL) Photometric Testing and Evaluation Report

**Prepared For:**

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**Approved By:**

Robert Higley, LC, Photometric Test Engineer

**Product Information**

<b>Manufacturer</b>	CREE
<b>Model Number (SKU)</b>	PWY-EDG-3M-xx-02-E-UL-350-40K / BXBPx318E-UH7
<b>Serial Number</b>	PL05698-001A
<b>LED Type</b>	XP-G2

**Product Description**

Fabricated Bronze painted metal top trim/heatsink, eighteen LEDs mounted around perimeter of a cast bronze painted metal plate, cast bronze painted metal circuit board retaining ring, one clear non-integral plastic lens below each LED. Cast bronze painted metal lower housing cap with three vertical supports.

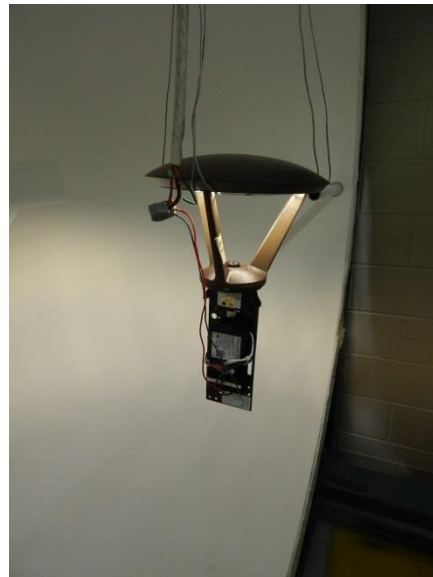
**Driver Information (Where Applicable)**

Tomas Research Products LED25W-36-C0700

Length	Width	Height
11.00"	9.00"	7.00"

**Sample**

The following sample was submitted for evaluation





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Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	1474.5	1469.7	lm
Efficacy	69.36	69.32	lm/W
Correlated Color Temperature (CCT)	3920	K	
Color Rendering Index (CRI)	73		
R <sub>9</sub>	-18		
Duv	0.00486012		
S/P Ratio*	1.48		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	21.26	21.40	21.20	21.40	W
Input Current	0.18	0.09	0.18	0.09	A
Input Voltage	120.17	276.97	120.06	277.02	V
Power Factor	0.991	0.889	0.992	0.893	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.04	0.04	0.14	0.08	%
Total Harmonic Distortion (Amperage)	6.85	9.16	6.96	9.37	%

**Note:** All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Max Candela	877.7	Cd
Angle of Max Candela (Horizontal)	60	°
Angle of Max Candela (Vertical)	67.5	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	48	61	min
Total Operating Time (Stabilization + Test)	53	81	min
Ambient Temperature	25.4	24.9	°C



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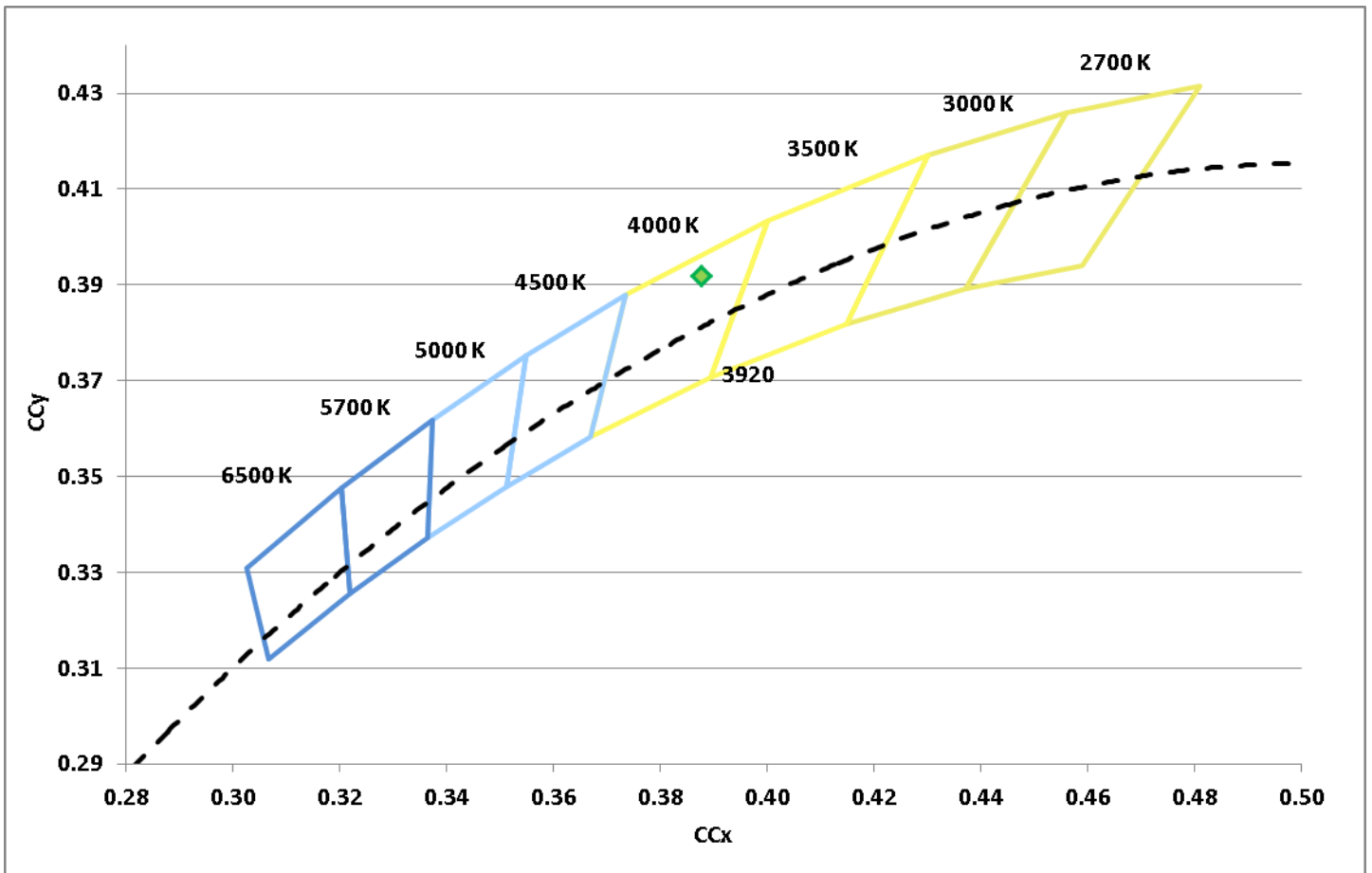
### Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3878	0.3919	0.2239	0.3394	0.2239	0.5092	0.00486012

### Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
73	71	78	83	74	70	69	82	57	-18	47	71	43	71	90

### Chromaticity Diagram



**Spectral Distribution**

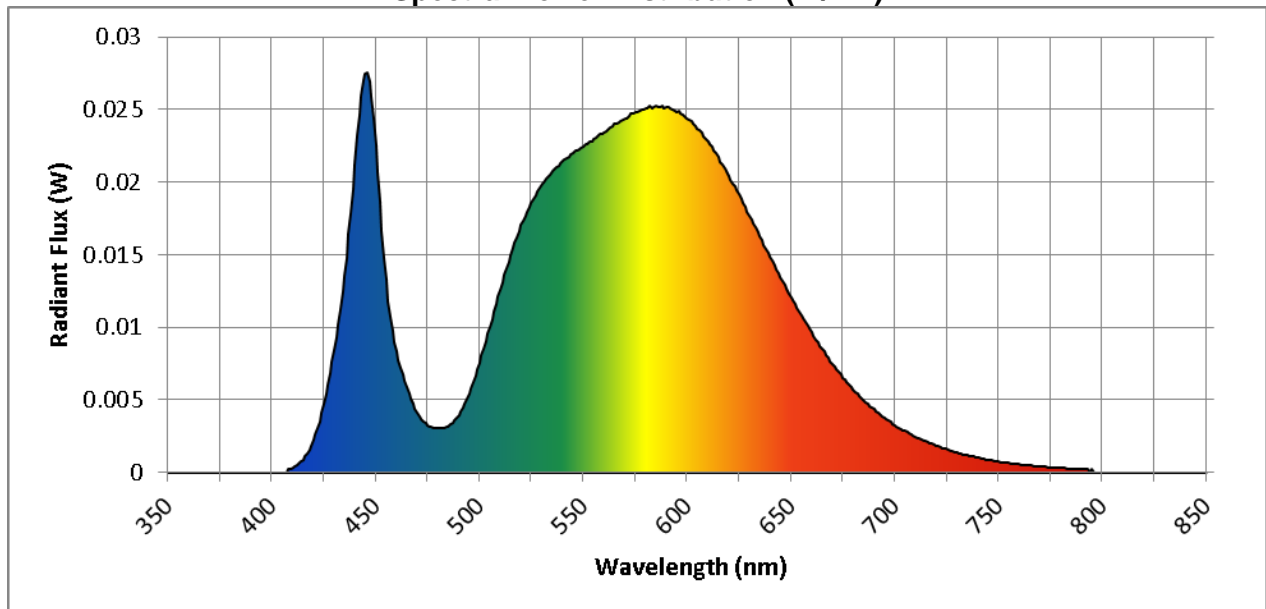
$\lambda$ (nm)	W/nm
360	0.000053
370	0.000079
380	0.000041
390	0.000025
400	0.000023
410	0.000316
420	0.002221
430	0.008430
440	0.021214
450	0.022483
460	0.008343
470	0.004092
480	0.003045
490	0.003936
500	0.007554
510	0.012593
520	0.017040

$\lambda$ (nm)	W/nm
530	0.019875
540	0.021440
550	0.022454
560	0.023431
570	0.024378
580	0.025075
590	0.025207
600	0.024348
610	0.022792
620	0.020404
630	0.017716
640	0.014831
650	0.012080
660	0.009653
670	0.007447
680	0.005723
690	0.004346

$\lambda$ (nm)	W/nm
700	0.003256
710	0.002454
720	0.001849
730	0.001378
740	0.001011
750	0.000750
760	0.000550
770	0.000395
780	0.000297
790	0.000221
800	0.000171
810	0.000122
820	0.000063
830	0.000022

<b>Dominant Wavelength</b>	577	nm
<b>Peak Wavelength</b>	446	nm

**Spectral Power Distribution (W/nm)**



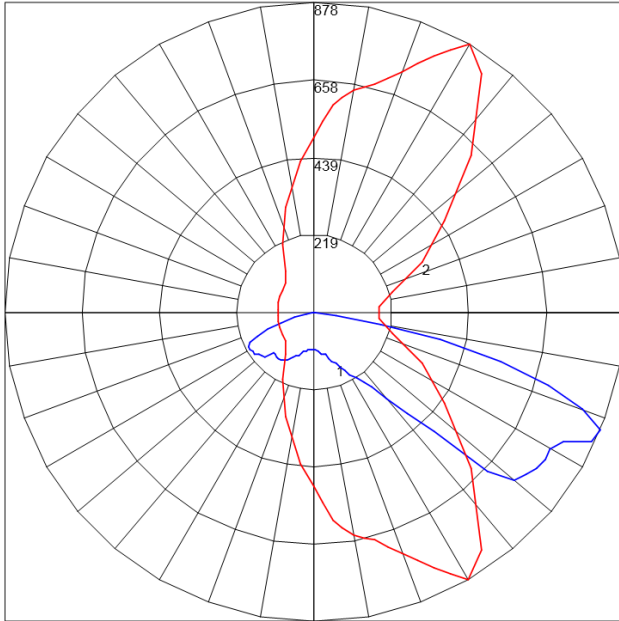


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### Zonal Lumen Summary

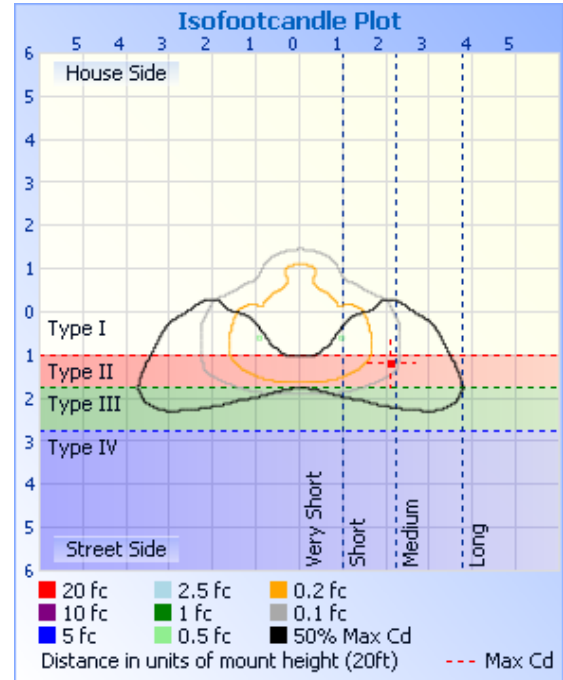
Zone	Lumens	% of Total	Zone	Lumens	% of Total
0-5	2.6	0.2%	90-95	0.0	0.0%
5-10	7.9	0.5%	95-100	0.0	0.0%
10-15	13.6	0.9%	100-105	0.0	0.0%
15-20	21.1	1.4%	105-110	0.0	0.0%
20-25	30.7	2.1%	110-115	0.0	0.0%
25-30	42.8	2.9%	115-120	0.0	0.0%
30-35	57.1	3.9%	120-125	0.0	0.0%
35-40	74.1	5.0%	125-130	0.0	0.0%
40-45	101.5	6.9%	130-135	0.0	0.0%
45-50	151.0	10.3%	135-140	0.0	0.0%
50-55	189.9	12.9%	140-145	0.0	0.0%
55-60	202.0	13.7%	145-150	0.0	0.0%
60-65	201.7	13.7%	150-155	0.0	0.0%
65-70	177.8	12.1%	155-160	0.0	0.0%
70-75	125.0	8.5%	160-165	0.0	0.0%
75-80	57.7	3.9%	165-170	0.0	0.0%
80-85	12.1	0.8%	170-175	0.0	0.0%
85-90	1.5	0.1%	175-180	0.0	0.0%
			<b>Total</b>	<b>1469.7 lm</b>	<b>100%</b>

### Candela Plot



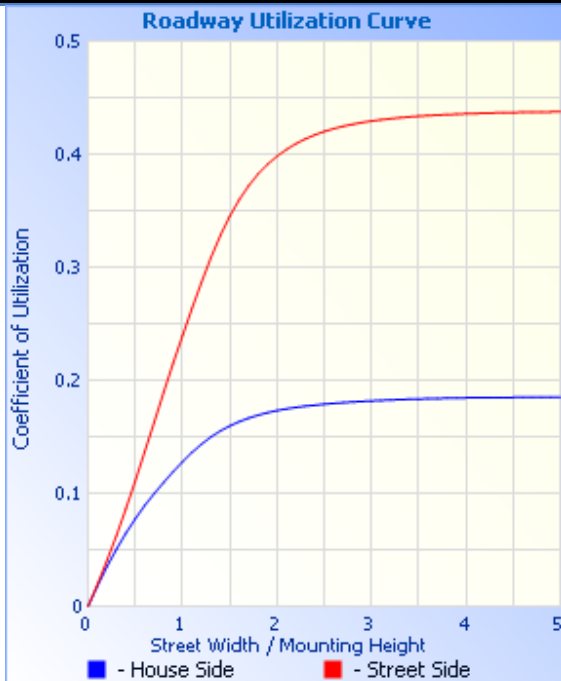
Maximum Candela = 877.7 Located At Horizontal Angle = 60, Vertical Angle = 67.5  
 # 1 - Vertical Plane Through Horizontal Angles (60 - 240) (Through Max. Cd.)  
 # 2 - Horizontal Cone Through Vertical Angle (67.5) (Through Max. Cd.)

### Illuminance Plot

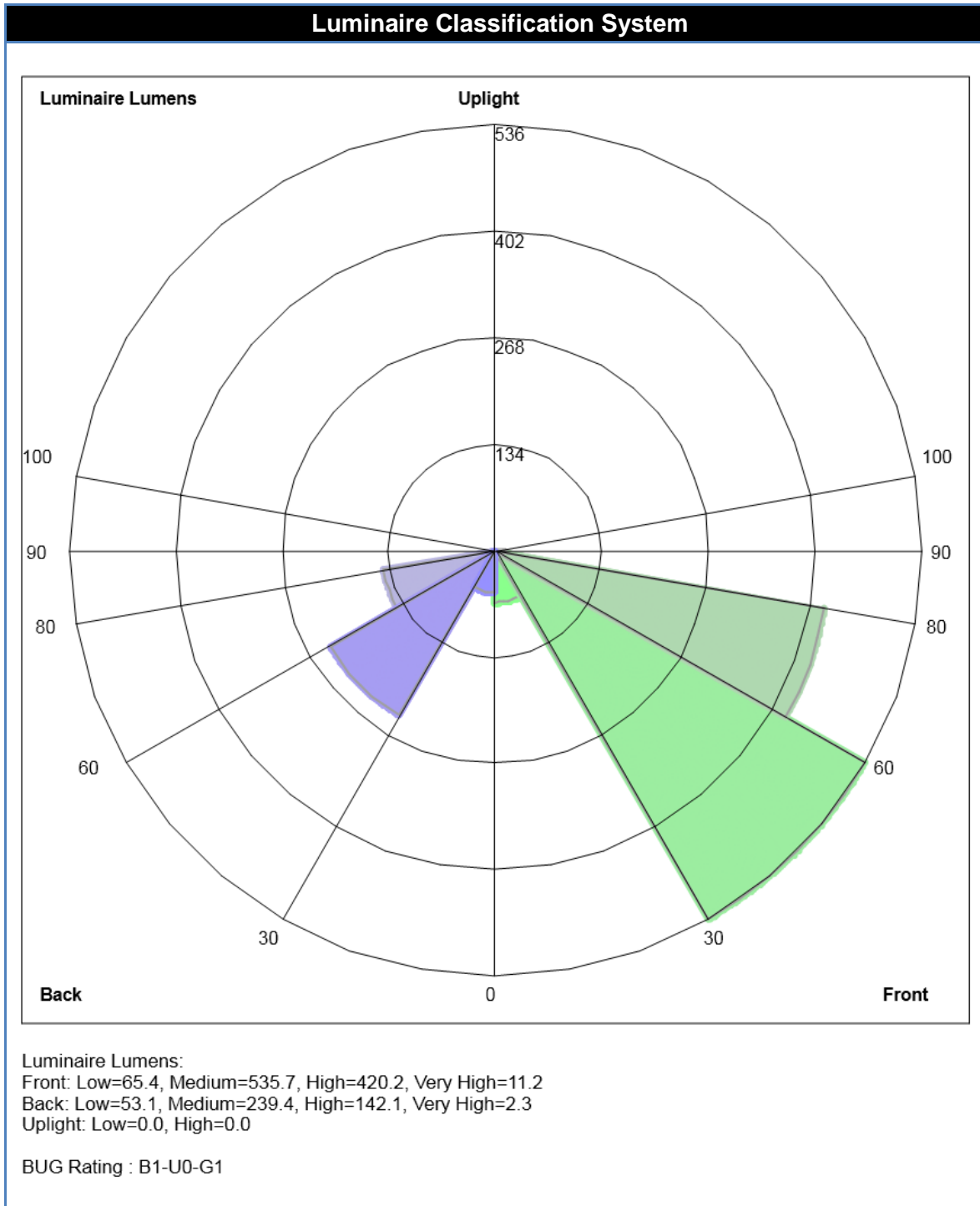


Distance in units of mount height (20ft) --- Max Cd

### Roadway Utilization



Roadway Summary	Lumens	% Lamp
Cutoff Classification	SEMICUTOFF	
Distribution	TYPE III, SHORT	
Downward Street Side	1,032.7	70.3%
Downward House Side	436.9	29.7%
Downward Total	1,469.6	100%
Upward Street Side	0	0%
Upward House Side	0	0%
Upward Total	0	0%
<b>Total Lumens</b>	<b>1,469.6</b>	<b>100%</b>







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### Candela Tabulations

	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	95	105	115	125	135	145	155	165	175	180	
0	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	
2.5	104	104	104	105	105	106	107	107	107	107	107	107	107	108	107	107	107	108	107	107	107	107	107	106	106	106	106	106	106	106	
5	105	106	106	107	107	108	110	110	110	111	111	111	111	112	112	112	112	112	112	111	111	110	110	106	104	103	105	104	102	101	
7.5	111	112	112	113	114	115	117	118	118	119	119	119	119	118	118	118	118	118	118	117	115	113	109	108	105	104	103	99	98		
10	116	115	113	117	115	113	115	120	122	124	122	120	120	119	118	117	117	118	118	117	113	109	107	111	109	103	106	106	99	100	
12.5	120	120	121	117	116	118	120	124	125	126	124	122	124	126	125	124	121	118	117	116	118	118	114	111	111	104	102	94	87	90	
15	128	130	130	123	122	124	124	124	129	134	134	135	133	132	130	128	127	126	126	126	125	127	118	115	110	105	102	94	93	95	
17.5	140	141	143	137	137	135	137	138	141	144	141	138	138	137	136	136	136	136	136	134	132	135	130	124	121	114	112	110	102	101	104
20	150	151	150	151	149	149	146	148	149	151	149	147	147	146	147	148	149	149	146	144	140	137	132	128	121	120	119	109	108	109	
22.5	158	167	158	167	169	169	158	156	157	157	157	158	158	157	156	158	161	159	156	148	142	137	134	126	127	123	114	109	110		
25	178	186	170	183	190	178	174	172	171	170	166	164	164	164	166	168	170	171	171	170	159	150	144	140	134	129	127	118	119	120	
27.5	197	203	192	206	202	197	191	188	186	185	182	180	178	177	176	175	178	182	182	183	172	162	150	149	141	137	131	128	130	131	
30	212	223	218	229	215	217	209	204	202	201	199	196	195	194	191	189	187	184	186	189	184	177	158	155	147	142	134	139	140	142	
32.5	228	246	242	243	235	235	229	223	221	220	216	213	211	209	206	203	199	195	190	185	189	190	167	160	153	144	142	148	150	152	
35	251	270	267	249	253	256	250	245	244	242	237	233	230	227	221	216	211	206	200	193	188	190	170	161	152	145	150	157	159	161	
37.5	296	320	307	288	275	274	268	267	264	261	255	249	245	242	235	228	222	216	209	202	195	194	174	161	150	148	157	167	170	172	
40	339	357	342	331	321	312	320	318	310	302	292	281	277	272	263	254	241	228	218	208	197	190	175	158	152	154	172	183	194	210	
42.5	377	386	366	374	373	369	381	393	381	369	349	328	322	316	308	300	283	266	251	236	214	185	169	156	156	163	187	213	216	226	
45	426	433	396	424	445	443	487	479	470	461	446	431	407	384	368	353	334	315	299	283	247	201	174	157	150	177	211	240	244	241	
47.5	562	535	506	518	530	562	658	667	631	594	561	527	503	478	453	427	409	391	366	340	301	235	202	174	166	198	236	267	274	281	
50	622	619	584	595	594	624	721	742	712	681	638	595	563	531	503	475	462	448	420	392	348	247	213	178	170	206	249	268	274	278	
52.5	633	658	640	664	633	637	740	760	730	699	663	626	593	560	533	507	493	480	451	422	378	270	221	175	178	213	247	259	260	266	
55	600	630	643	712	673	659	745	772	737	703	667	630	606	582	554	524	508	492	467	443	400	288	231	180	179	210	228	238	236	245	
57.5	552	540	588	702	713	692	744	775	744	713	674	636	610	585	559	534	510	487	466	446	403	296	228	181	174	194	202	209	207	216	
60	445	445	515	616	709	741	754	774	743	711	676	640	617	593	578	563	541	520	497	474	429	314	243	180	168	173	182	183	179	186	
62.5	372	355	413	524	652	755	806	795	757	718	696	674	662	650	643	636	616	598	566	534	495	345	257	168	152	156	158	156	153	157	
65	267	260	321	433	552	710	846	867	822	776	750	724	707	690	681	671	645	620	581	543	492	343	244	160	139	138	133	129	126	127	
67.5	182	185	230	339	450	630	826	878	840	801	764	726	698	670	655	641	616	592	543	494	432	308	210	144	116	110	107	104	104	104	
70	122	133	159	238	367	530	747	809	782	754	717	680	643	606	584	562	540	519	471	424	352	259	166	113	89	80	86	90	90	92	
72.5	71	79	112	164	266	418	636	696	681	666	628	591	554	516	492	468	445	421	380	340	268	192	119	81	67	65	79	86	86	90	
75	42	49	70	107	177	291	490	547	543	538	503	469	436	404	379	354	330	306	272	237	177	118	72	48	44	51	62	71	67	63	
77.5	28	32	39	64	107	171	313	366	367	368	342	317	292	267	245	224	202	180	158	136	92	54	28	20	20	23	24	27	24	21	
80	25	24	21	30	56	88	157	190	194	197	184	170	153	135	121	107	95	82	69	57	35	15	8	7	8	9	7	7	6	5	
82.5	22	20	14	11	16	27	50	61	62	64	59	55	48	40	35	30	25	20	16	13	8	5	4	4	5	6	5	4	4	4	
85	18	16	10	6	3	3	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	3	3	3	4	4	3	4	3	3	
87.5	7	7	4	3	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	2	2	
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Candela Tabulations (Continued)

	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	95	105	115	125	135	145	155	165	175	180
92.5	0	0	0	0	0	0	0	0	0	0	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	0	0	0	0	0	0	0	0	0	0



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### Integrating Sphere Equipment List

Description	Manufacturer	Model	Serial Number
2M Sphere	Everfine	2M	1004156T
CCD Array Spectrometer	Otsuka	MC-9801	98010360
Programmable AC Source	Adaptive	FC200	2280220
Power Analyzer	Chroma	66202	66202 0005018

### Goniophotometer Equipment List

Description	Manufacturer	Model	Serial Number
AC Power Source	Elgar	CW1251P	1248A02602
Type C Goniophotometer	LSI / UL	6440T	6440PN2028
Spectroradiometer	Gooch & Housego	770VIS/NIR	12415189
Power Meter	Yokogawa	WT210	91M945458

### Test Methods Used:

Title	Description
ANSI C82.77:2002	Harmonic Emission Limits- Related Power Quality Reqt's for Lighting Equipment
CIE Pub. 13.3:1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. 15:2004	Colorimetry
IES LM-58:1994	Spectroradiometric Measurements
IES LM-65:2001	Single-Ended Compact Fluorescent Lamps – Life Test Performance
IES LM-79:2008	Electrical and Photometric Measurements of Solid-State Lighting Products

### Reference Standard Used:

Equipment	Description
2m Sphere	Tungsten Halogen Omni-Directional 75W Calibration Lamp, Serial Number F119
Type C Goniophotometer and Spectrometer	Tungsten Halogen Omni-Directional 500W Calibration Lamp, Serial Numbers 13C069, 13C070, 13C071. For color calibration of spectrometer, 13C074.

**Disclaimers:**

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

The results contained in this report pertain only to the tested sample.

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\*Items marked with a single asterisk are not covered by the NVLAP accreditation.

In the event that the recorded temperature is outside of  $25 \pm 1^\circ\text{C}$ , this is considered a non-standard condition.

\*\* In the event that testing is subcontracted, test results in this report marked with the symbol \*\*, or noted as “Sphere” or “Integrating Sphere”, were performed by the subcontracted laboratory identified in the footer on the first page of this report. Subcontracted testing is strictly integrating sphere based. All other tests are performed using a Type C goniophotometer.

The integrating sphere information in the equipment list, report items marked with \*\*, or results specifically identified as “Sphere” or “Integrating Sphere”, are the actual equipment used, and test results produced, by the subcontracted laboratory when subcontracting is indicated on the cover page.

**Additional Comments:**

The photos below are intended to show the orientation and fixturing/set-up of the units under test. These are critical to understanding the results of the test given the sensitivity of many products and measurement systems to orientation and set-up considerations, and also for reproducing the conditions of the test.

Goniophotometer



Integrating Sphere





NVLAP Lab Code 500089-0

**Document Revision History:**

Each subsequent revision of this report replaces the preceding report.

Date	Rev	DCN #	Change at the time of this test	By	Approval
3/23/2015	A	DMS	Origination	L. Li	R. Higley