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FOR THE SCOPE OF
ACCREDITATION UNDER NVLAP LAB
CODE 100402-0.

VERBATIM AMERICAS

TEST REPORT

SCOPE OF WORK
Electrical and Photometric tests as required to the IESNA test standard.

MODEL NUMBER
LED PANEL PN22-W25-C40-P

PROJECT NUMBER
G102710907

REPORT NUMBER
102710907CRT-038

ISSUE DATE
June 5, 2018

REVISION DATE
None

PAGES
10

DOCUMENT CONTROL NUMBER
TBD
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TEST REPORT

REPORT NO.: 102710907CRT-038
REPORT DATE: June 5, 2018

TEST OF (1) 2X2 PANEL

MODEL NO. LED PANEL PN22-W25-C40-P

RENDERED TO:

VERBATIM AMERICAS
8210 UNIVERSITY EXECUTIVE PARK DRIVE, SUITE 300
CHARLOTTE, NC 28262

STATEMENT OF LIMITATION

NVLAP Lab Code 100402-0. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

AUTHORIZATION

The testing performed was authorized by signed quote number Qu-00707669.

STANDARDS USED

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting
ANSI NEMA ANSLG C78.377: 2015: Specifications of the Chromaticity of Solid State Lighting Products

SAMPLE INFORMATION

CONTROL NO.	MODEL/SERIAL NO.	DESCRIPTION	TYPE	RECEIVED
CRT1805251459-002	LED PANEL PN22-W25-C40-P	2x2 Panel	Production	05/25/18

DATE OF TESTS

May 31, 2018 through June 5, 2018.

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TEST REPORT

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SUMMARY

MODEL NO:	LED PANEL PN22-W25-C40-P
DESCRIPTION:	2x2 Panel
PART NO:	99911

CRITERIA	RESULTS	
	INTEGRATING SPHERE	GONIOPHOTOMETER
Lumen Output (lumens)	3193.3	3147.8
Input Power (W) @ 100 (VAC)	25.90	25.71
Lumen Efficacy (lm/W)	123.3	122.4
Input Power Factor ( ) @ 100 (VAC)	0.994	0.995

CRITERIA	RESULTS
Input Current ATHD (%) @ 100 (VAC)	8.43
Correlated Color Temperature (K)	4208
Color Rendering Index - Ra ( )	80.8
Color Rendering - R9 ( )	-4.2
DUV ( )	0.0024
Chromaticity Coordinate (x)	0.373
Chromaticity Coordinate (y)	0.378
Chromaticity Coordinate (u')	0.220
Chromaticity Coordinate (v')	0.501
Input Power Factor ( ) @ 277 (VAC)	0.914
Input Current ATHD (%) @ 277 (VAC)	14.67

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EQUIPMENT LIST

EQUIPMENT USED	MODEL NO.	CONTROL NO.	LAST CAL DATE	CAL DUE DATE
LSI High Speed Mirror Goniometer	6440	---	05/10/18	06/10/18
Elgar AC Power Supply	CW1251	---	VBU	VBU
Sorenson DC Power Supply	XG 150-10	---	VBU	VBU
Yokogawa Power Analyzer	WT210	E464	05/03/18	05/03/19
Omega Thermometer	DPi8-C24	M263	05/03/18	05/03/19
M-D Building Products Digital Level	Smart Tool	L112	04/21/18	04/21/19
NIST Luminous Intensity Standard Source	NBS10322	N1427	01/09/17	01/09/19
NIST Luminous Intensity Standard Source	NBS10332	N1435	01/09/17	01/09/19
NIST Luminous Intensity Standard Source	NBS10265	N1437	01/09/17	01/09/19
NIST Luminous Flux Standard Source	NBS10428	N1424	01/11/17	01/11/19
Elgar AC Power Supply	CW1251	---	VBU	VBU
Sorenson DC Power Supply	XFR 150-8	---	VBU	VBU
Yokogawa Power Analyzer	WT1600	E537	01/22/18	01/22/19
Fluke Thermometer	53 II	T1318	04/09/18	04/09/19
Fluke Multimeter	87V	D590	04/26/18	04/26/19
3M Integrating Sphere Spectrometer System	CDS 1100	---	05/02/18	06/02/18
Fisher Scientific Stopwatch	14-649-9	N1132	02/15/18	02/15/19
Secondary Spectral Intensity Standard Source	BS5186	RF5186	01/28/18	01/28/19
Secondary Luminous Flux Standard Source	BS3616	--	01/28/18	01/28/19
Secondary Luminous Flux Standard Source	BS4116	--	01/28/18	01/28/19
Secondary Luminous Flux Standard Source	6836	--	01/28/18	01/28/19

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TEST METHODS

SEASONING IN SAMPLE ORIENTATION - LED PRODUCTS

No seasoning was performed in accordance with IESNA LM-79.

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - INTEGRATING SPHERE METHOD

A Spectroradiometer and integrating sphere were used to measure light output, correlated color temperature, chromaticity coordinates, color rendering index, and the spectral distribution for each SSL unit.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation. Each SSL unit was allowed to stabilize for at least thirty minutes before measurements were made. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a power analyzer.

The calibration of the sphere photometer-spectroradiometer system is traceable to the National Institute of Standards and Technology.

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - DISTRIBUTION METHOD

A Type C Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for the SSL sample.

Ambient temperature was measured equal to the height of the sample mounted on the goniometer equipment. The SSL sample was operated on the client provided driver at rated input volts in its designated orientation. The SSL sample was allowed to stabilize for at least thirty minutes before measurements were made. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a power analyzer.

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TEST REPORT

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RESULTS OF TESTS

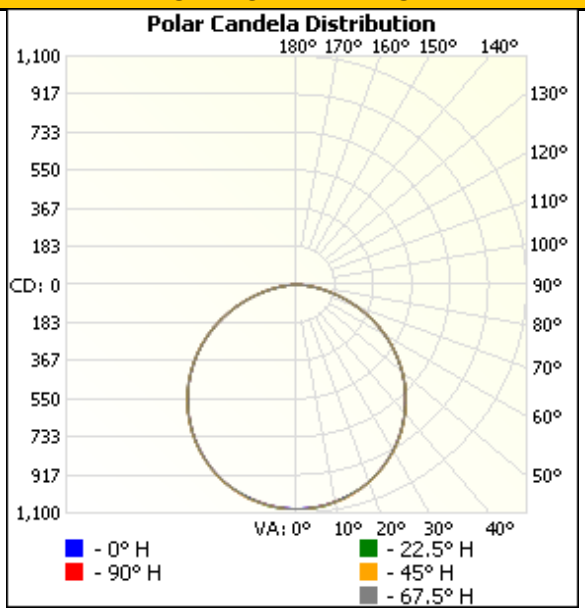
PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - DISTRIBUTION METHOD (25°C +/- 1°C)

INTERTEK CONTROL NO.	BASE POSITION	INPUT VOLTAGE (VAC)	INPUT CURRENT (mA)	INPUT POWER (W)	INPUT POWER FACTOR ( )	LIGHT OUTPUT (lm)	LUMEN EFFICACY (lm/W)
CRT1805251459-002	Base Up	100.07	258.3	25.71	0.995	3147.8	122.4

INTENSITY SUMMARY - CANDELAS

Angle	0	22.5	45	67.5	90
0	1081	1081	1081	1081	1081
5	1075	1077	1076	1076	1076
10	1062	1062	1064	1063	1060
15	1039	1039	1042	1040	1041
20	1010	1012	1012	1010	1010
25	971	972	972	971	970
30	923	924	925	923	923
35	868	868	869	867	867
40	806	806	807	805	804
45	736	736	738	736	735
50	660	660	661	660	660
55	579	578	579	579	578
60	491	491	493	491	491
65	400	399	400	400	399
70	304	304	306	305	304
75	209	209	212	212	211
80	120	121	124	124	124
85	47	48	51	51	51
90	0	0	0	0	0

POLAR CANDELA PLOT



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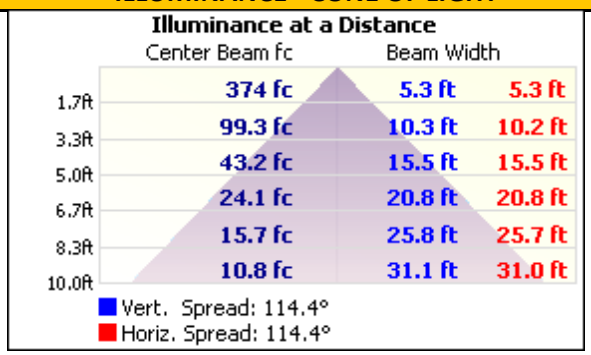
RESULTS OF TESTS

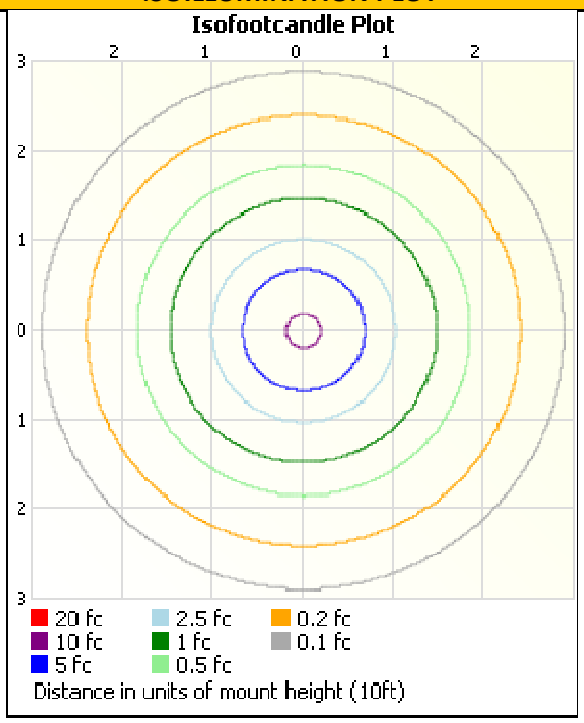
PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - DISTRIBUTION METHOD (25°C +/- 1°C)

MOUNTING HEIGHT: 10ft

ILLUMINANCE - CONE OF LIGHT



ISOILLUMINATION PLOT



ZONAL LUMEN SUMMARY AND PERCENTAGES

ZONE	LUMENS	% LUMINAIRE
0-30	843.7	26.8
0-40	1386.7	44.1
0-60	2471.0	78.5
60-90	676.8	21.5
0-90	3147.8	100.0
90-180	0.0	0.0
0-180	3147.8	100.0

ZONE	LUMENS	% LUMINAIRE
0-10	102.3	3.2
10-20	293.8	9.3
20-30	447.6	14.2
30-40	543.0	17.3
40-50	567.6	18.0
50-60	516.7	16.4
60-70	394.8	12.5
70-80	223.3	7.1
80-90	58.6	1.9

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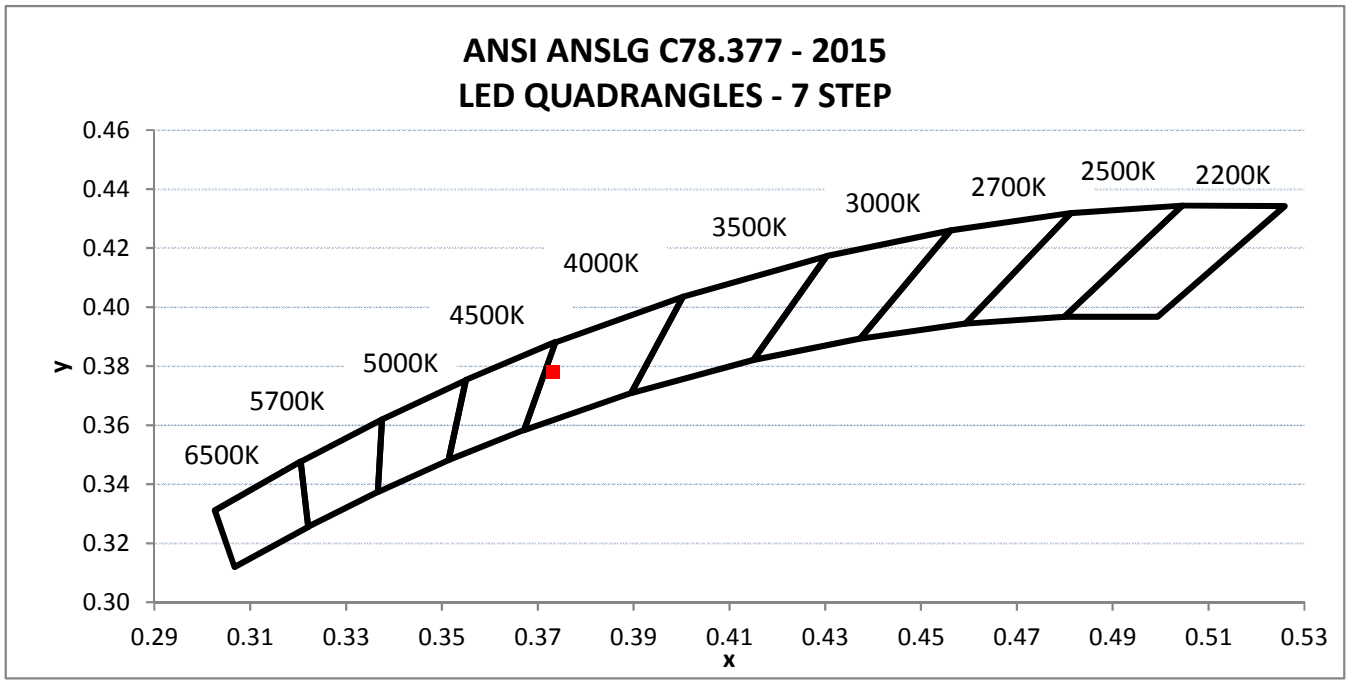
RESULTS OF TESTS

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - INTEGRATING SPHERE METHOD (25°C +/- 1°C)

INTERTEK CONTROL NO.	BASE POSITION	INPUT VOLTAGE (VAC)	INPUT CURRENT (mA)	INPUT POWER (W)	INPUT POWER FACTOR ( )	INPUT CURRENT ATHD (%)
CRT1805251459-002	Base Up	100.00	260.7	25.90	0.994	8.43
		277.00	100.8	25.51	0.914	14.67

LIGHT OUTPUT (lm)	LUMEN EFFICACY (lm/W)	CORRELATED COLOR TEMPERATURE - CCT (K)	CRI - Ra ( )	CRI - R9 ( )	DUV ( )
3193.3	123.3	4208	80.8	-4.2	0.0024

CIE 1931 CHROMATICITY COORDINATE (x)	CIE 1931 CHROMATICITY COORDINATE (y)	CIE 1976 CHROMATICITY COORDINATE (u')	CIE 1976 CHROMATICITY COORDINATE (v')
0.373	0.378	0.220	0.501



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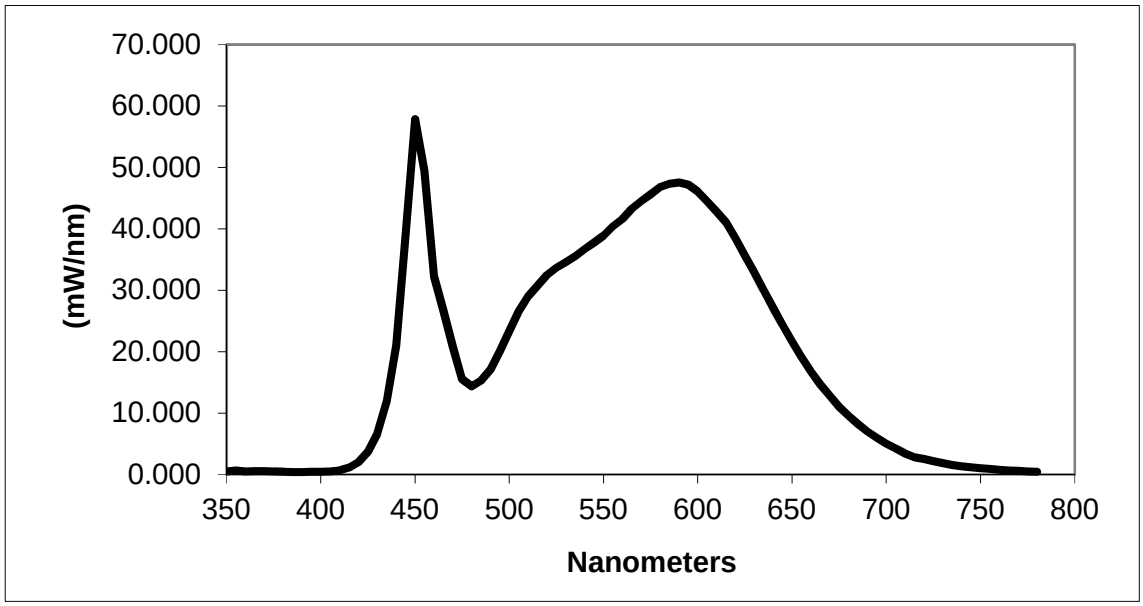
RESULTS OF TESTS

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - INTEGRATING SPHERE METHOD (25°C +/- 1°C)

SPECTRAL DISTRIBUTION OVER VISIBLE WAVELENGTHS*							
nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.538	460	32.288	570	44.553	680	9.518
355	0.652	465	26.778	575	45.610	685	8.202
360	0.532	470	20.786	580	46.846	690	7.021
365	0.568	475	15.521	585	47.349	695	5.985
370	0.561	480	14.375	590	47.553	700	5.034
375	0.499	485	15.331	595	47.204	705	4.187
380	0.447	490	17.157	600	46.085	710	3.414
385	0.431	495	20.102	605	44.503	715	2.826
390	0.418	500	23.312	610	42.835	720	2.522
395	0.437	505	26.594	615	41.059	725	2.189
400	0.439	510	29.014	620	38.508	730	1.861
405	0.504	515	30.784	625	35.636	735	1.581
410	0.692	520	32.479	630	32.940	740	1.365
415	1.161	525	33.715	635	29.994	745	1.172
420	2.018	530	34.588	640	27.148	750	1.035
425	3.756	535	35.564	645	24.351	755	0.909
430	6.670	540	36.738	650	21.660	760	0.791
435	11.956	545	37.747	655	19.186	765	0.683
440	21.025	550	38.924	660	16.757	770	0.602
445	38.877	555	40.392	665	14.678	775	0.528
450	57.867	560	41.608	670	12.791	780	0.455
455	49.454	565	43.287	675	11.042		

*Without correction of sample absorption.



End Of Test Results

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PICTURES

CONCLUSION

The results tabulated in this report are representative of the actual test samples submitted for this report only. The data is provided to the client for further evaluation. Compliance to the referenced specification requirements was not determined in this report.

In Charge Of Tests:

Melanie Brittain

Melanie Brittain
Associate Engineer
Lighting Division

Report Reviewed By:

Jeff Davis
Engineering Manager
Lighting Division

Attachments: IES File

REVISION HISTORY

JOB NUMBER	DATE OF REVISION	PROJECT HANDLER	REVIEWED BY	REVISION NOTE
None				