

# VISUAL COMFORT GROUP TEST REPORT

## SCOPE OF WORK

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

## MODEL NUMBER

ENN2x-LO930ADI12x (60 Degree)

## REPORT NUMBER

103643585CHI-043

## ISSUE DATE

February 15, 2019

## REVISION DATE

None

## DOCUMENT CONTROL NUMBER

TBD

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**REPORT NO.: 103643585CHI-043**

**REPORT DATE: February 15, 2019**

**TEST REPORT**

**TEST OF ONE LOW-VOLTAGE RECESSED**

MODEL NO. ENN2X-LO930ADI12X (60 DEGREE)  
LED MODEL NO. LUMINUS CXM-6-30-90-18-AC40-F5-3  
DRIVER MODEL NO. LTF DL110W250C1840-3000

**RENDERED TO:**

VISUAL COMFORT GROUP  
7400 LINDER AVE.  
SKOKIE IL 60077

**AUTHORIZATION**

The testing performed was authorized by signed quote number Qu-00912313.

**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

**DESCRIPTION OF SAMPLE**

The client submitted one production sample of model number ENN2x-LO930ADI12x (60 Degree). The sample was received by Intertek on February 7, 2019 in undamaged condition and one sample was tested as received. The sample designation was AH02072019031148.

**DATE OF TESTS**

February 14, 2019

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**REPORT DATE: February 15, 2019**

**TEST REPORT**

**SUMMARY**

<b>MODEL NO:</b>	ENN2x-LO930ADI12x (60 Degree)
<b>DESCRIPTION:</b>	Low-voltage recessed

CRITERIA	RESULTS	
	INTEGRATING SPHERE	GONIOPHOTOMETER
Lumen Output (lumens)	472.9	483.4
Input Power (W) @ 12 (VAC)	5.87	5.88
Lumen Efficacy (lm/W)	80.6	82.2
Input Power Factor @ 12 (VAC)	0.638	0.632

CRITERIA	RESULTS
Input Current ATHD (%) @ 12 (VAC)	69.93
Correlated Color Temperature (K)	3131
Color Rendering Index - Ra	91.1
Color Rendering - R9	61.2
DUV	0.0014
Chromaticity Coordinate (x)	0.430
Chromaticity Coordinate (y)	0.406
Chromaticity Coordinate (u')	0.245
Chromaticity Coordinate (v')	0.521

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**EQUIPMENT LIST**

<b>EQUIPMENT USED</b>	<b>MODEL NO.</b>	<b>CONTROL NO.</b>	<b>LAST CAL DATE</b>	<b>CAL DUE DATE</b>
Yokogawa Power Meter	WT210	146919	7/9/2018	7/9/2019
Omega Newport Thermometer	DPI8-C24	146920	10/4/2018	10/4/2019
LSI High Speed Mirror Goniometer	6440T	146928	VBU	VBU
Newport Thermohygrometer	iServer	146379	4/16/2018	4/16/2019
Pacific, AC power supply	118-ACX	CHI0358	VBU	VBU
Staco Energy Product Variac	3PN2210B	146360	VBU	VBU
Labsphere 2M Sphere & Spectroradiometer	CDS1100	146137	VBU	VBU
Elgar AC Power Supply	CW1251M	146113	VBU	VBU
Sorenson DC Power Supply	XFR150-8	146847	VBU	VBU
Yokogawa Power Analyzer	WT1600	146767	4/5/2018	4/5/2019
Omega Temperature	MDSi8	146873	7/10/2018	7/10/2019
Newport Thermohygrometer	iTHX-M	146961	4/16/2018	4/16/2019

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**TEST REPORT**

**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 was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index 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.

**TEST REPORT**

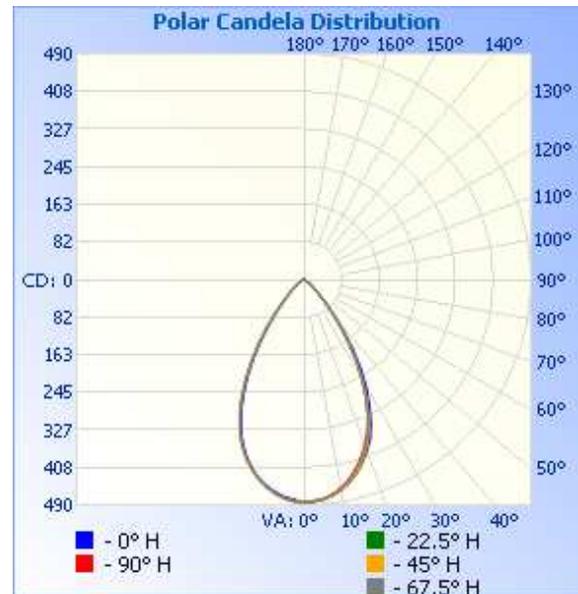
**RESULTS OF TESTS**

**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)
AH02072019031148	Base Up	12.0	775.8	5.88	0.632	483.4	82.2

**INTENSITY SUMMARY - CANDELAS**

Angle	0	22.5	45	67.5	90
0	484	484	484	484	484
5	478	480	480	479	478
10	464	464	463	461	459
15	436	437	435	431	427
20	397	394	392	387	384
25	343	333	332	327	325
30	270	255	254	252	251
35	185	172	171	170	170
40	106	98	98	97	97
45	55	50	50	50	50
50	30	28	28	28	28
55	19	17	17	17	17
60	10	9	9	9	9
65	4	4	4	4	4
70	2	1	1	1	1
75	1	0	0	0	0
80	0	0	0	0	0
85	0	0	0	0	0
90	0	0	0	0	0



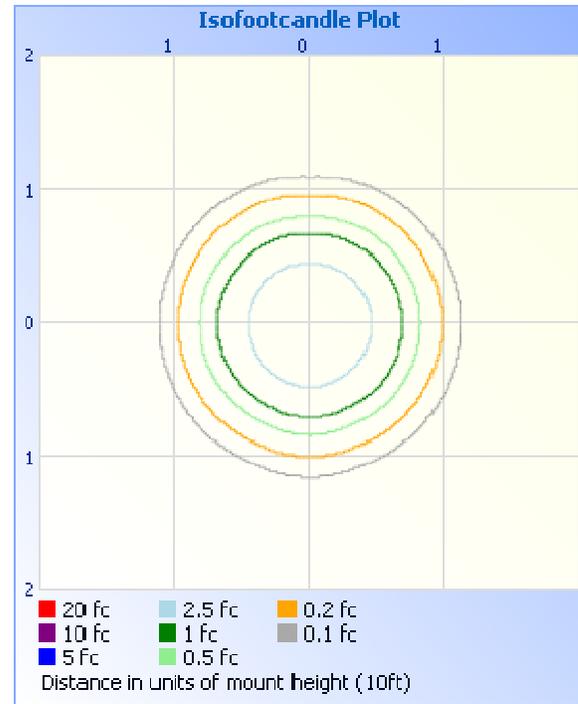
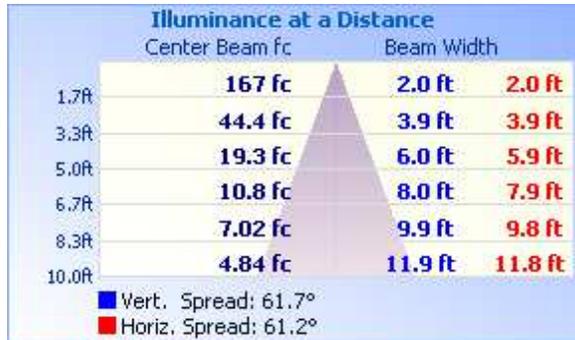
**TEST REPORT**

**RESULTS OF TESTS**

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

**MOUNTING HEIGHT: 10ft**

ILLUMINANCE - CONE OF LIGHT	ISOILLUMINATION PLOT
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**ZONAL LUMEN SUMMARY AND PERCENTAGES**

ZONE	LUMENS	% LUMINAIRE
0-30	314.3	65.0
0-40	420.5	87.0
0-60	478.3	98.9
60-90	5.1	1.1
70-100	0.7	0.2
90-120	0.0	0.0
0-90	483.4	100.0
90-180	0.0	0.0
0-180	483.4	100.0

ZONE	LUMENS	% LUMINAIRE
0-10	45.0	9.3
10-20	120.4	24.9
20-30	148.8	30.8
30-40	106.2	22.0
40-50	42.0	8.7
50-60	15.8	3.3
60-70	4.3	0.9
70-80	0.6	0.1
80-90	0.1	0.0

**TEST REPORT**

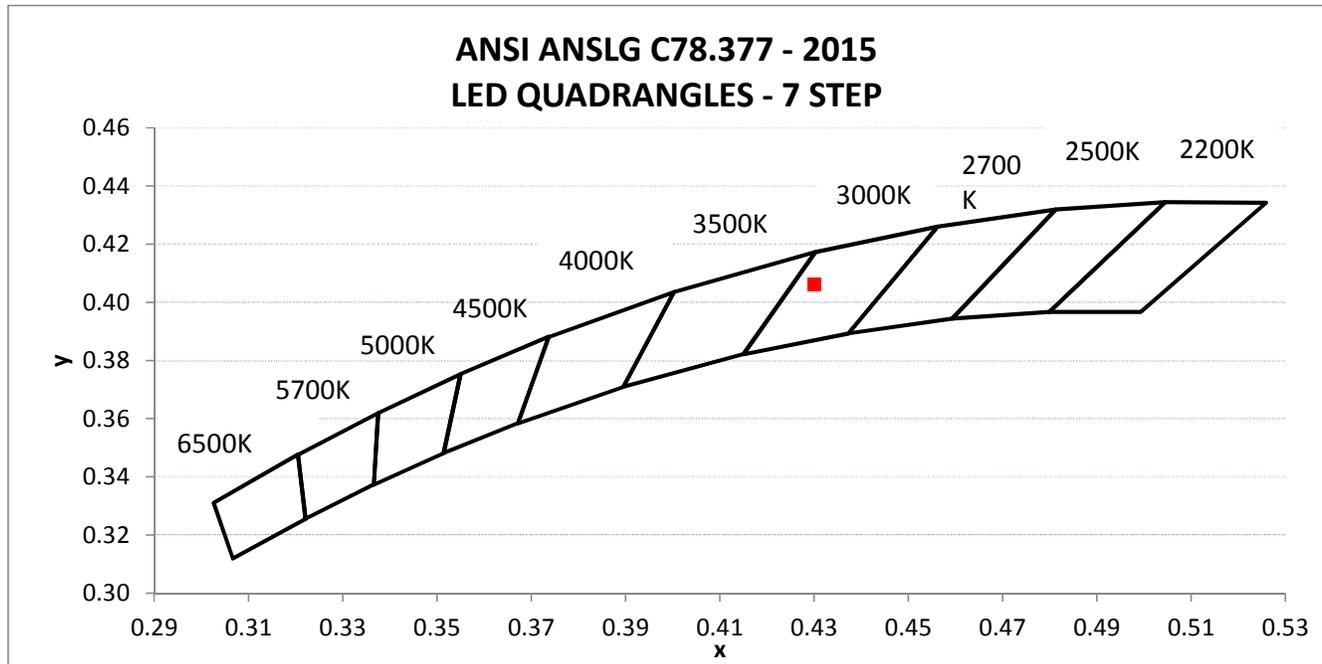
**RESULTS OF TESTS**

**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 (%)
AH02072019031148	Base Up	12.00	765.70	5.87	0.638	69.93

LIGHT OUTPUT (lm)	LUMEN EFFICACY (lm/W)	CORRELATED COLOR TEMPERATURE - CCT (K)	CRI - Ra ( )	CRI - R9 ( )	DUV ( )
472.9	80.6	3131	91.1	61.2	0.0014

CIE 1931 CHROMATICITY COORDINATE (x)	CIE 1931 CHROMATICITY COORDINATE (y)	CIE 1976 CHROMATICITY COORDINATE (u')	CIE 1976 CHROMATICITY COORDINATE (v')
0.430	0.406	0.245	0.521



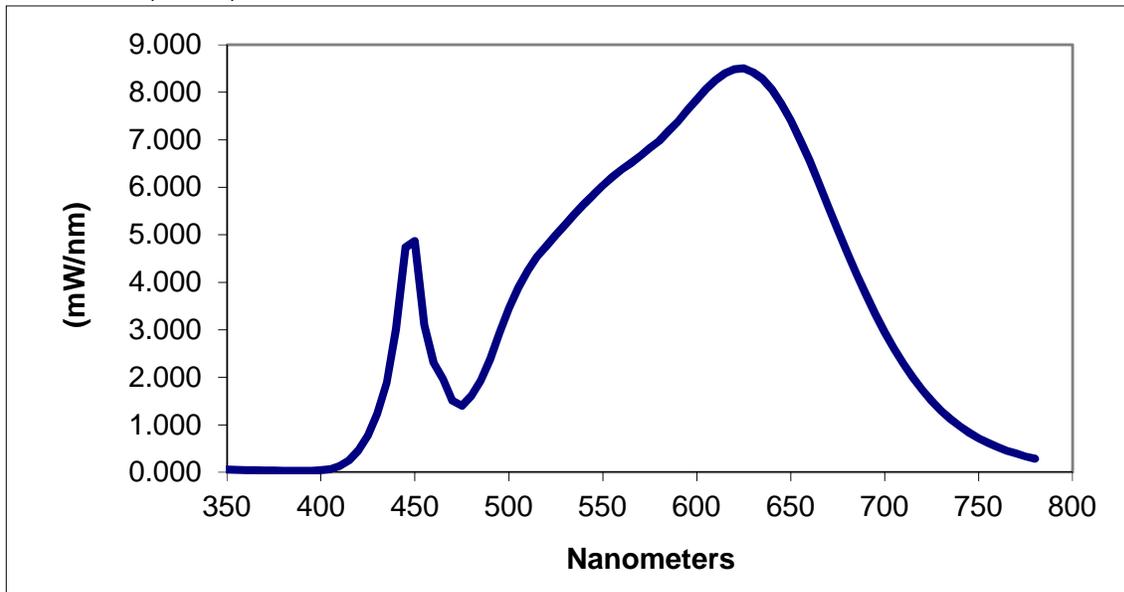
**TEST REPORT**

**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	0.057	460	2.313	570	6.660	680	4.629
355	0.055	465	1.960	575	6.823	685	4.177
360	0.047	470	1.506	580	6.980	690	3.742
365	0.048	475	1.402	585	7.185	695	3.336
370	0.039	480	1.612	590	7.387	700	2.947
375	0.038	485	1.931	595	7.620	705	2.602
380	0.034	490	2.385	600	7.848	710	2.282
385	0.030	495	2.932	605	8.068	715	1.997
390	0.032	500	3.457	610	8.254	720	1.735
395	0.030	505	3.883	615	8.399	725	1.504
400	0.043	510	4.246	620	8.486	730	1.300
405	0.069	515	4.541	625	8.504	735	1.123
410	0.133	520	4.765	630	8.417	740	0.968
415	0.253	525	4.992	635	8.282	745	0.834
420	0.460	530	5.215	640	8.054	750	0.719
425	0.777	535	5.436	645	7.761	755	0.620
430	1.230	540	5.654	650	7.405	760	0.533
435	1.885	545	5.841	655	6.998	765	0.455
440	3.015	550	6.038	660	6.560	770	0.392
445	4.737	555	6.212	665	6.087	775	0.333
450	4.867	560	6.378	670	5.587	780	0.287
455	3.099	565	6.511	675	5.110		

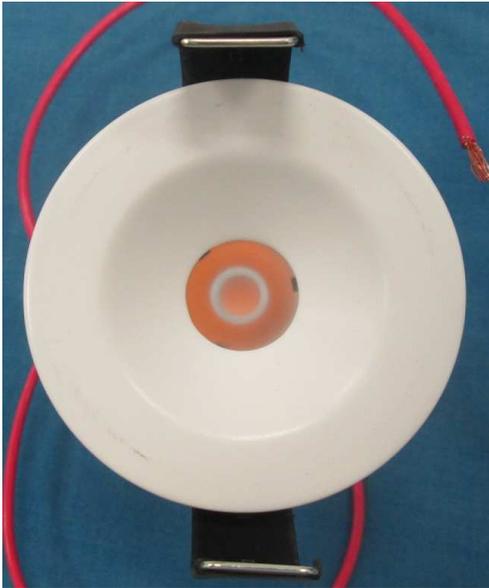
\*Without correction of sample absorption.



**End Of Test Results**

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**TEST REPORT**  
**PICTURES**



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:

Timothy Quigley  
Engineer  
Lighting Division

Report Reviewed By:

Hector Huitron  
Associate Engineer  
Lighting Division

Attachments: IES File

**REVISION HISTORY**

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