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

REPORT

3933 US ROUTE 11, CORTLAND, NEW YORK 13045

Project No. G102322298 Date: July 11, 2016

REPORT NO. 102322298CRT-036

TEST OF ONE LED CANDLE E26 BASE 2700K DIMMABLE

MODEL NO. LED CANDLE CD-L315-C27-D-E26
PART NO. 99318

RENDERED TO:

VERBATIM AMERICAS
1200 W.T. HARRIS BLVD.
CHARLOTTE, NC 28269

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

STATEMENT OF LIMITATION: 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-00647973.

STANDARDS USED:

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting
ANSI NEMA ANSLG C78.377: 2011: Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number LED Candle CD-L315-C27-D-E26. The sample was received by Intertek on June 28, 2016 in undamaged condition and one sample was tested as received. The sample designation was CRT16006281028-001A.

DATE OF TESTS: June 28, 2016 through July 7, 2016.

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SUMMARY:

MODEL NO. LED Candle CD-L315-C27-D-E26
DESCRIPTION: LED Candle E26 base 2700K Dimmable

Criteria	Integrating Sphere	Goniophotometer
Light Output (Lumens)	353.3	348.7
Total Power (W)	4.552	4.565
Lumen Efficacy (Lm/W)	77.60	76.40
Power Factor ( )	0.820	0.820

Criteria	Results
Current ATHD (%)	55.55
Correlated Color Temp. (CCT-K)	2666
Color Rendering Index (CRI - Ra)	80.6
CRI - R9	3.3
DUV ( )	0.001
Chromaticity Coordinate (x)	0.464
Chromaticity Coordinate (y)	0.415
Chromaticity Coordinate (u')	0.264
Chromaticity Coordinate (v')	0.530

EQUIPMENT LIST

Equipment Used	Model No.	Control No.	Last Cal.	Cal. Due
LSI High Speed Mirror Goniometer	6440	---	07/06/16	08/06/16
Elgar AC Power Supply	CW1251	---	VBU	VBU
Sorenson DC Power Supply	XG 150-10	---	VBU	VBU
Yokogawa Power Analyzer	WT210	E464	05/02/16	05/02/17
Omega Thermometer	DPi8-C24	M263	05/02/16	05/02/17
M-D Building Products Digital Level	Smart Tool	L112	04/08/16	04/08/17
NIST Luminous Intensity Standard Source	NBS10322	N1427	12/12/14	12/12/16
NIST Luminous Intensity Standard Source	NBS10215	N1432	12/12/14	12/12/16
NIST Luminous Intensity Standard Source	960629-3	N1428	12/12/14	12/12/16
NIST Luminous Flux Standard Source	NBS10428	N1424	12/17/14	12/17/16
2M Integrating Sphere Spectrometer System	CDS 600	W/N308	06/15/16	07/15/16
Yokogawa Power Analyzer	WT1600	E474	04/25/16	04/25/17
Extech Hygro-Thermometer	445715	T1550	01/08/16	01/08/17
Fisher Scientific Stopwatch	14-649-9	N1404	08/22/15	08/22/16
Sorensen DC Power Supply	XFR 35-35	---	VBU	VBU
Xantrex DC Power Supply	XTR 150-5.6	---	VBU	VBU
Elgar AC Power Supply	CW1251	---	VBU	VBU
Secondary Spectral Intensity Standard Source	BS5186	RF5186	01/27/16	01/27/17
Secondary Luminous Flux Standard Source	BS3616	---	01/27/16	01/27/17
Secondary Luminous Flux Standard Source	BS4116	---	01/27/16	01/27/17
Secondary Luminous Flux Standard Source	BS3612	---	01/27/16	01/27/17

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 Labsphere Model CDS 1100 CCD Array Spectroradiometer and two meter or ten foot 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 LSI Type C High Speed Model 6440 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.

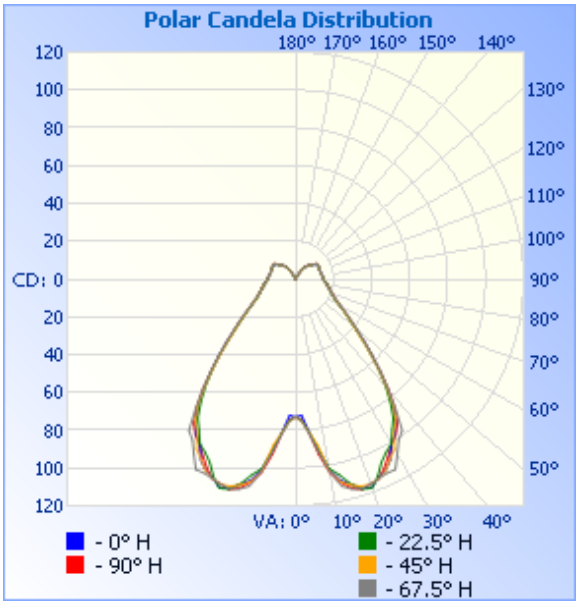
RESULTS:

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) – Distribution Method

Intertek Control No.	Base Orientation	Input Voltage (VAC)	Input Current (mA)	Input Power (W)	Input Power Factor ( )	Light Output (Lumens)	Lumen Efficacy (lm/W)
CRT16006281028-001A	Base Up	120.09	46.35	4.565	0.820	348.7	76.40

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	73	73	73	73	73
5	81	81	81	82	82
10	102	102	103	104	104
15	112	112	113	115	114
20	117	118	116	115	115
25	112	107	112	113	110
30	101	101	104	107	101
35	92	90	92	98	93
40	75	74	75	76	76
45	57	56	56	57	56
50	42	42	42	43	42
55	33	32	33	34	33
60	26	26	26	27	26
65	22	22	22	23	22
70	20	20	20	20	20
75	18	18	18	18	18
80	17	17	17	16	17
85	16	16	15	15	16
90	15	15	15	15	15
95	14	14	14	14	14
100	14	14	14	14	14
105	14	14	14	14	14
110	14	14	14	14	14
115	14	14	14	14	14
120	14	14	14	14	14
125	14	14	14	14	14
130	12	12	12	12	12
135	10	10	10	11	11
140	9	9	9	9	9
145	7	7	7	7	7
150	3	3	4	4	3

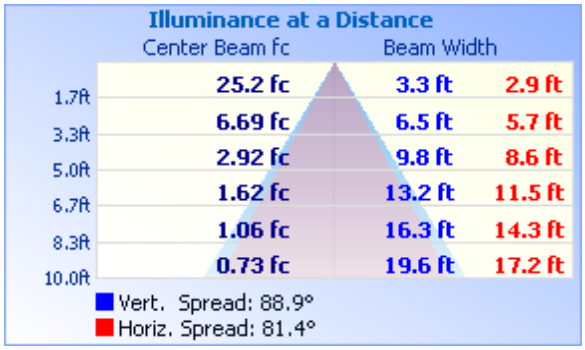


RESULTS:

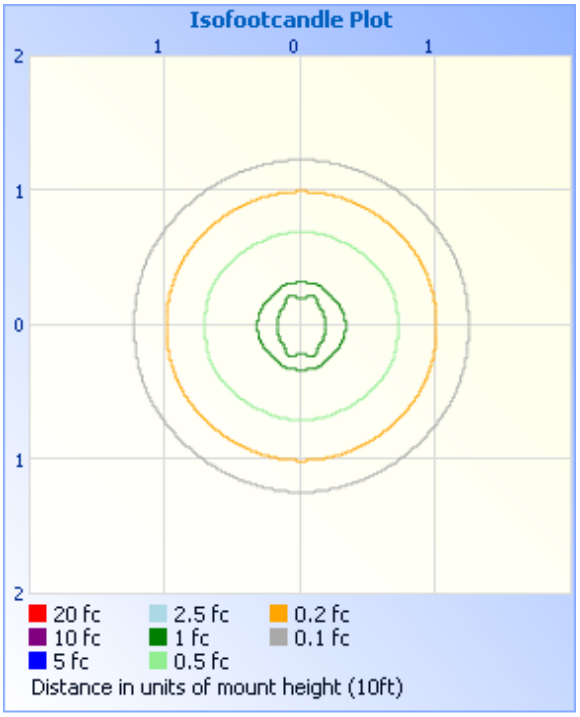
Illumination Plots

Mounting Height: 10ft

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	91.4	26.2
0-40	148.2	42.5
0-60	221.8	63.6
60-90	58.5	16.8
0-90	280.3	80.4
90-180	68.3	19.6
0-180	348.7	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	8.5	2.4
10-20	32.0	9.2
20-30	50.9	14.6
30-40	56.8	16.3
40-50	43.9	12.6
50-60	29.8	8.5
60-70	22.4	6.4
70-80	19.2	5.5
80-90	16.9	4.9
90-100	15.6	4.5
100-110	14.4	4.1
110-120	13.6	3.9
120-130	12.1	3.5
130-140	8.1	2.3
140-150	4.3	1.2
150-160	0.3	0.1

RESULTS:

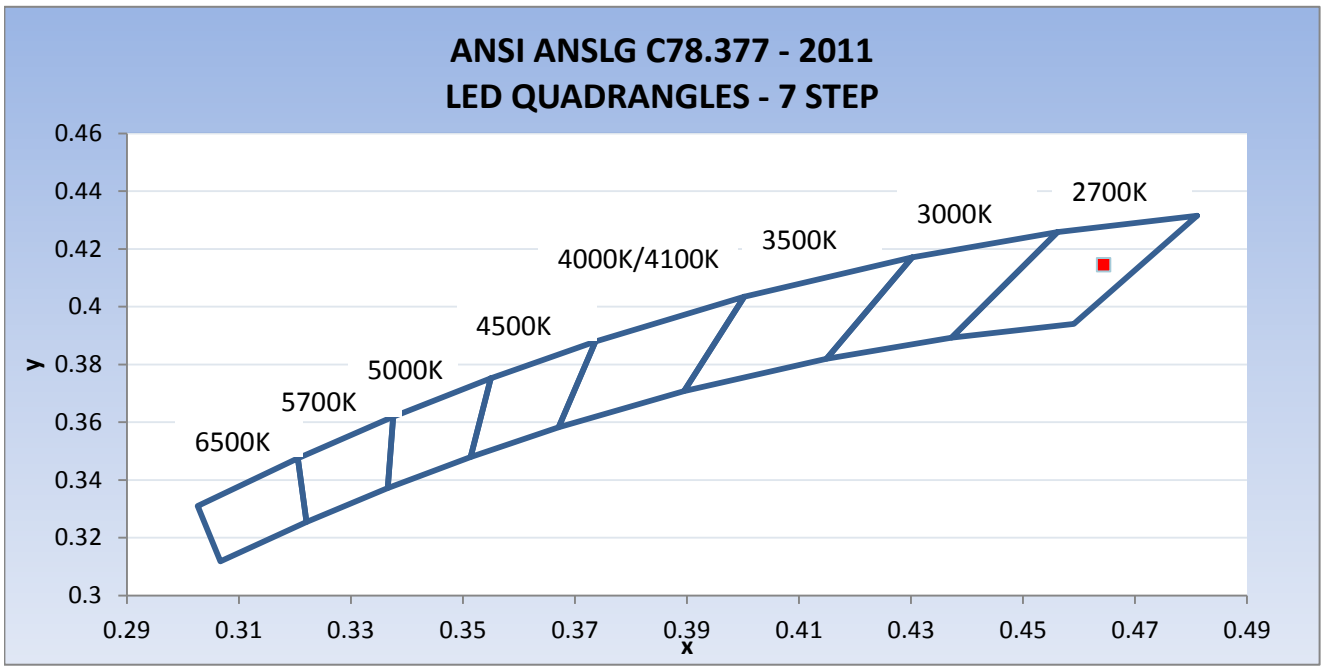
Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) – Sphere Method

Intertek Control No.	Base Orientation	Input Voltage (VAC)	Input Current (mA)	Input Power (W)	Input Power Factor ( )	Current ATHD (%)
CRT16006281028-001A	Base Up	120.02	46.29	4.552	0.820	55.55

Light Output (Lumens)	Lumen Efficacy (lm/W)	Correlated Color Temperature - CCT (K)	CRI -Ra	CRI -R9	DUV ( )
353.3	77.60	2666	80.6	3.3	0.001

CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
0.464	0.415	0.264	0.530

ANSI C78.377 SSL Chromaticity (2011 Version)

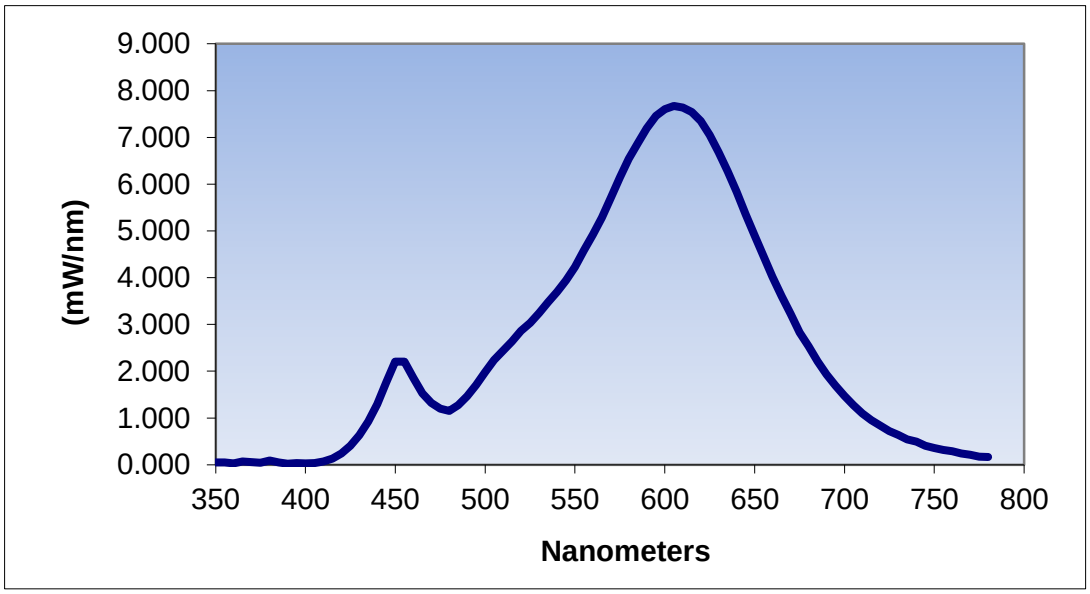


RESULTS:

Spectral Distribution Over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.049	460	1.859	570	5.708	680	2.536
355	0.049	465	1.525	575	6.137	685	2.210
360	0.031	470	1.323	580	6.545	690	1.929
365	0.069	475	1.199	585	6.871	695	1.690
370	0.058	480	1.148	590	7.195	700	1.471
375	0.045	485	1.273	595	7.463	705	1.274
380	0.087	490	1.463	600	7.603	710	1.099
385	0.051	495	1.707	605	7.670	715	0.956
390	0.021	500	1.979	610	7.636	720	0.834
395	0.038	505	2.237	615	7.546	725	0.720
400	0.032	510	2.440	620	7.351	730	0.640
405	0.039	515	2.639	625	7.051	735	0.541
410	0.072	520	2.864	630	6.677	740	0.491
415	0.135	525	3.032	635	6.278	745	0.408
420	0.243	530	3.247	640	5.842	750	0.356
425	0.408	535	3.477	645	5.360	755	0.315
430	0.633	540	3.697	650	4.909	760	0.287
435	0.928	545	3.946	655	4.465	765	0.244
440	1.298	550	4.229	660	4.021	770	0.217
445	1.763	555	4.584	665	3.604	775	0.171
450	2.206	560	4.920	670	3.226	780	0.168
455	2.208	565	5.286	675	2.826		

Spectral Data Over Visible Wavelengths



PRODUCT PICTURE:

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
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Report Reviewed By:

Ryan Siddon

Ryan Siddon
Engineer
Lighting Division

Attachments: IES File - CRT1606281028-001A