IESNA LM-79: 2008

Measurement and Test Report

For

Verbatim Americas LLC

1200 W.T.Harris Boulevard,Charlotte,NC

Aug 23, 2016

Product Name:	LED
Model No:	99572; 99571
Test Engineer:	David Zhang
Report No.:	BTR66.181.16.0003.15
Sample Received Date:	July 01, 2015
Test Performed Date:	July 01, 2015 to July 07, 2015
Reviewed By:	Steven Huo
Prepared By:	**BEST Test Service Shenzhen Co., Ltd.** 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China TEL: +86-755-28236006 FAX: +86-755-23467087-811 Email: certification@bestcert.cn

NVLAP LAB CODE 200770-0

Efficient Lighting Initiative

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

Applicant	:	Verbatim Americas LLC
Product Name	:	LED
Model No	:	99572; 99571
Brand	:	Verbatim
Nominal Operation Voltage	:	AC 120V
Nominal Power	:	17W
Nominal CCT	:	3000K
Nominal CRI	:	90
Nominal Lumen Output	:	1200Lumens
Nominal Life Time	:	25000Hours
Number of hours operated prior to measurement for new sample	:	0 Hours
Stabilization Time	:	1.5 Hours
Total operating time for measurement include stabilization time	:	3.5 Hours
Nominal Shape of Bulb(Designation)	:	☒Standard ☐Non Standard ☐Omnidirectional A, BT, P, PS, S, T ☐Decorative B, BA, C, CA, DC, F, G ☒Directional PAR, MR, R, BR
Date of Receiving Sample	:	July 01, 2015
Date of Measurement performed	:	July 01, 2015 to July 07, 2015
Measurement quantities measured	:	1 pcs
Orientation During Testing	:	Base Up
Test Requested	:	1. Electrical and Photometric Test 2. Luminous Intensity Distribution Test

Note: These models are all the same except for the beam angle, here we choose 99572 to be tested and the other to share the test data.

1.2 Objective

The following test report is prepared on behalf of Verbatim Americas LLC in accordance with IESNA LM-79-08, used the following American National Standards or illumination Engineering Society of North America test guides:

ANSI C78.377-2008: Specifications for the Chromaticity of Solid State Lighting Products;
ANSI C79.1– 2002: American National Standard for Electric Lamps – Nomenclature for Glass Bulbs Intended for Use with Electric Lamps;
ANSI C78.20 – 2003: American National Standard for Electric Lamps – A, G, PS, and Similar Shapes with E26 Medium Screw Bases;
ANSI C78.21 – 2011: American National Standard for Incandescent lamps – PAR and R Shapes;
ANSI C78.24 – 2001: American National Standard for Electric Lamps – Two-inch (51 mm);
Integral-reflector Lamps with Front Covers and GU5.3 or GX 5.3 Bases;
ANSI/IEC C81.61-2003: American National Standard for Electric Lamp Bases;
ANSI/IEEE C62.41 – 1991 (01-May-1991): Surge Voltages in Low-Voltage AC Power Circuits, Recommended Practice for;
CIE Publication No. 13.3 – 1995: Method of Measuring and Specifying Color Rendering of Light Sources;
CIE Publication No. 18.2 – 1983: The Basis of Physical Photometry;

IESNA LM-16-1993: Practical Guide to Colorimetry of Light Sources;
IESNA LM-28-89: Guide for the Selection, Care, and Use of Electrical Instruments in the Photometric Laboratory;
IESNA LM-79-08 Electrical and Photometric Measurement of Solid State Lighting Products
UL 1993 – 1999: Standard for Self-Ballasted Lamps and Lamp Adapters;
UL 8750 – 2009: Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.3 Test Facility Description

The Energy Efficiency Lab used by BEST to collect energy efficiency measurement data is located in 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China. BEST Test Service Shenzhen Co., Ltd is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200770-0). BEST Test Service Shenzhen Co., Ltd is also an ELI accredited lab for lighting products (ELI Certificate No. ELI-L04-2010) and UL accredited lab for lighting products.

1.4 Test Equipment List

Apparatus List	Device	Cal. Date	Cal Due Date
1	Integral Sphere+ Spectrophotometer System	Mar 10, 2015	Mar 09, 2016
2	Digital Power Meter	Oct 18, 2015	Oct 17, 2016
3	Goniophotometer+ Spectrophotometer System	Nov 20, 2014	Nov 19, 2015
4	Standard Light Source	Sep 17, 2015	Sep 16, 2016
5	Standard Light Source	Sep 17, 2015	Sep 16, 2016
6	Digital Storage Oscilloscope	Oct 18, 2015	Oct 17, 2016
7	Ultra Compact Simulator	Oct 20, 2015	Oct 19, 2016
8	Temperature Chamber	Oct 20, 2015	Oct 19, 2016
9	Digital Caliper	Nov 20, 2014	Nov 19, 2015
10	Digital CC&CV DC Power Supply(30V 5A)	N/A	N/A
11	5 1/2 Digital Multimeter	Oct 18, 2015	Oct 17, 2016
12	Digital CC&CV DC Power Supply(120V 10A)	N/A	N/A
13	6 1/2 Digital Multimeter	Oct 18, 2015	Oct 17, 2016
14	Digital Multimeter	Oct 18, 2015	Oct 17, 2016
15	Temperature Recorder+Thermocouple	Nov 20, 2014	Nov 19, 2015
16	Timer Controller	Nov 20, 2014	Nov 19, 2015

Statement of Traceability: BEST Test Service Shenzhen Co., Ltd. *certifies that all calibration has been performed using suitable standards traceable to the NIM China.*

2 - Test Method

2.1 Photometric and Electrical Measurement (Integrated Sphere Method)

Total light output (luminous flux) for the 25℃ ±1℃ ambient temperature conditions is measured using a 1.6m 4∏ geometry integrating sphere. Temperature is measured at a position inside the sphere. Spectral radiant flux measurements are made using Lab sphere to the detector port of the integrating sphere. Each lamp is operated at rated voltage in its designated orientation. Each lamp should be stable before measurements are made. The determining method of stable is as follows:

Step 1 Take 3 measurements of the lamp light output at 15 minute interval (total time=30mintues.)This time period is in addition to the recommended pre-burning time.

Step 2 Calculate the percent difference between the maximum measured value and the minimum measured value for the three consecutive measurements.

Step 3 if the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.
Luminous flux, chromaticity coordinates, correlated color temperature and color rendering index for each lamp are calculated from the spectral radiant flux measurements taken at 2 nm intervals over the range 350 to 1050 nm. The calibration of the sphere photometer-spectrometer system is traceable to the NIST USA. Lamp efficacy (lumens per watts) for each lamp model is computed based on the revised luminous flux result. Electrical measurements including voltage, current, power and power factor are measured using the digital power Meter.

The total uncertainty of the light output measurements is estimated, at the 95% confidence level, not to exceed ±1.12% over the wavelength range 350-1050 nm.

2.2 Photometric and Electrical Measurement (GonioPhotometer Method)

A Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample; the photometric distance is 24m. Ambient temperature was measured equal to the height of the sample mounted on the Goniometer equipment. Each sample was operated at input rated voltage in its designated orientation. Each sample was allowed to be stable before measurement was made. Electrical measurements including voltage, current, power and power factor were measured using the Power Analyzer

Before each measurement, the method below should be used to determine the lamp is stable or not.

Step 1 Take 3 measurements of the lamp intensity at 15 minute interval (total time=30mintues.)This time period is in addition to the recommended pre-burning time.

Step 2 Calculate the percent difference between the maximum measured value and the minimum measured value for the three consecutive measurements.

Step 3 if the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.

Some graphics were created with Photometric Plus software.

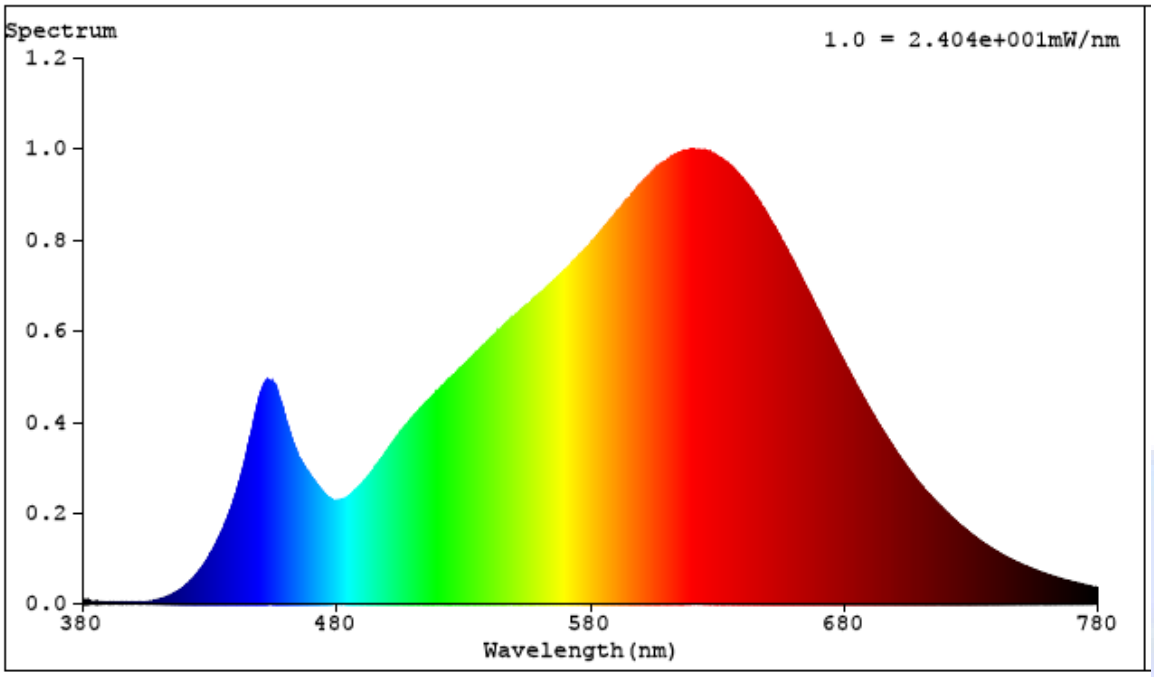
2.3 Deviation from standard operating procedure

None.

3 – Summary of Test Result

	Item	Test Result		Accreditation
Required Fields	Lumen Output (Lumens)	1480.8		NVLAP/EPA
	Luminous Efficacy (lm/w)	93.10		NVLAP/EPA
	Correlated Color Temperature (CCT)	2933		NVLAP/EPA
	Color Rendering Index– CRI	92.2		NVLAP/EPA
	Input Power (W)	15.91		NVLAP/EPA
Optional Fields	Power Type	☒AC	☐DC	/
	Input Voltage (V)	120.0		NVLAP/EPA
	Input Current (A)	0.1375		NVLAP/EPA
	Power Factor	0.9635		NVLAP/EPA
	x(CIE 1931)	0.4378		NVLAP/EPA
	y(CIE 1931)	0.3977		NVLAP/EPA
	u' (CIE 1976)	0.2539		NVLAP/EPA
	v' (CIE 1976)	0.5190		NVLAP/EPA
	Duv(CIE 1976)	-0.0027		NVLAP/EPA
	R9	60		NVLAP/EPA
	Beam Angle: (Degree)	38.1		NVLAP/EPA
	Center beam candlepower: (cd)	2437		NVLAP/EPA
	Zonal lumen density (0-60°):	97.2%		NVLAP/EPA
	Zonal lumen density (60-90°):	2.8%		NVLAP/EPA
	Zonal lumen density (90-120°):	0.0%		NVLAP/EPA
	Zonal lumen density (120-180°):	0.0%		NVLAP/EPA

4 – Spectral Flux Plots



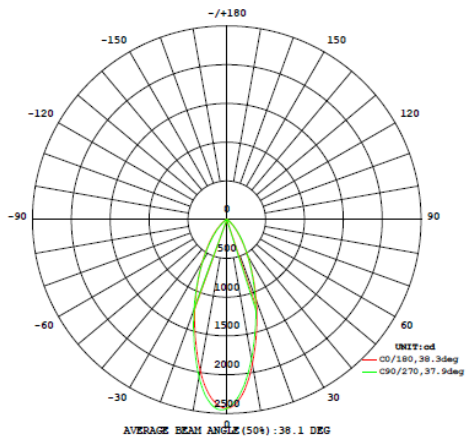
5 – EUT Photos

6 – Luminous Intensity Distribution Test Plots (CIE Chromaticity)

LAMP PHOTOMETRIC REPORT

Electrical: Voltage:120.0V Current:0.1375A Power:15.91W Factor:0.9635		
MODEL: 99572		
POWER: 17W	VOLTAGE: 120V	WORKING VOLTAGE: 120V
MANUFACTURER: Verbatim		Eff.: 93.10 lm/W

TOTAL FLUX: 1480.8 lm



γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%
10	1976	2048	2061	1981	1895	1821	1827	1893	0- 10	207.4	207.4	14
20	1203	1253	1238	1167	1110	1055	1071	1142	10- 20	422.5	629.9	42.5
30	636.4	655.6	625.4	577.8	533.1	515.8	536.9	601.7	20- 30	383.7	1014	68.5
40	299.6	295.3	271.0	236.2	221.8	215.4	238.8	274.2	30- 40	249.7	1263	85.3
50	115.6	108.1	93.46	80.99	77.50	73.12	85.24	102.3	40- 50	125.2	1389	93.8
60	40.91	38.66	35.88	33.98	32.40	30.58	33.02	37.21	50- 60	51.01	1440	97.2
70	19.16	19.46	19.19	18.74	17.01	15.72	16.65	17.81	60- 70	25.33	1465	98.9
80	6.912	7.976	8.213	7.906	6.251	5.106	5.423	5.945	70- 80	12.80	1478	99.8
90	0.0357	0.3413	0.3878	0.1586	0	0	0	0	80- 90	3.101	1481	100
100	0	0	0	0	0	0	0	0	90-100	0.0076	1481	100
110	0	0	0	0	0	0	0	0	100-110	0	1481	100
120	0	0	0	0	0	0	0	0	110-120	0.0000	1481	100
130	0	0	0	0	0	0	0	0	120-130	0.0000	1481	100
140	0	0	0	0	0	0	0	0	130-140	0	1481	100
150	0	0	0	0	0	0.0004	0.0011	0.0004	140-150	0.0000	1481	100
160	0.0083	0.0074	0.0074	0.0061	0.0099	0.0117	0.0128	0.0122	150-160	0.0018	1481	100
170	0.0211	0.0211	0.0202	0.0206	0.0227	0.0242	0.0256	0.0249	160-170	0.0044	1481	100
180	0	0	0	0	0	0	0	0	170-180	0.0018	1481	100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:2.455m [K=1.0000]

LUMINOUS DISTRIBUTION INTENSITY DATA

Electrical: Voltage:120.0V Current:0.1375A Power:15.91W Factor:0.9635		
MODEL: 99572		
POWER: 17W	VOLTAGE: 120V	WORKING VOLTAGE: 120V
MANUFACTURER: Verbatim		Eff.: 93.10 lm/W

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338			
0	2433	2434	2435	2437	2436	2437	2437	2437	2433	2434	2435	2437	2436	2437	2437	2437			
5	2310	2340	2365	2381	2385	2372	2343	2303	2269	2237	2216	2208	2212	2228	2255	2286			
10	1976	2016	2048	2067	2061	2032	1981	1930	1895	1849	1821	1817	1827	1853	1893	1942			
15	1569	1600	1626	1639	1628	1598	1552	1509	1479	1438	1416	1416	1426	1452	1494	1539			
20	1203	1230	1253	1255	1238	1212	1167	1126	1110	1073	1055	1056	1071	1103	1142	1182			
25	884	904	919	918	897	871	835	798	784	759	747	750	767	804	838	866			
30	636	650	656	642	625	603	578	546	533	520	516	520	537	569	602	623			
35	443	456	453	437	420	400	377	358	352	342	339	348	367	390	417	437			
40	300	304	295	284	271	253	236	226	222	217	215	223	239	256	274	293			
45	193	192	185	177	164	153	141	134	134	131	129	136	148	161	173	188			
50	116	114	108	101	93.5	86.5	81.0	77.0	77.5	75.3	73.1	76.8	85.2	93.2	102	113			
55	66.3	65.3	62.4	58.4	55.4	51.4	49.5	47.4	47.3	45.8	44.5	46.0	49.9	53.8	58.7	65.1			
60	40.9	40.4	38.7	37.0	35.9	34.9	34.0	32.7	32.4	31.3	30.6	31.4	33.0	34.9	37.2	40.3			
65	27.8	27.6	27.1	26.4	26.0	25.8	25.2	24.2	23.7	22.7	22.1	22.7	23.4	24.5	25.7	27.3			
70	19.2	19.4	19.5	19.4	19.2	19.1	18.7	17.8	17.0	16.2	15.7	16.0	16.6	17.0	17.8	18.8			
75	12.6	13.2	13.5	13.6	13.6	13.5	13.2	12.4	11.4	10.6	10.1	10.2	10.7	10.9	11.5	12.2			
80	6.91	7.55	7.98	8.14	8.21	8.12	7.91	7.19	6.25	5.54	5.11	5.13	5.42	5.54	5.94	6.52			
85	2.76	3.21	3.55	3.65	3.71	3.69	3.53	2.95	2.36	1.85	1.55	1.54	1.66	1.79	2.05	2.41			
90	0.04	0.21	0.34	0.40	0.39	0.31	0.16	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01			
160	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01			
165	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02			
170	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02			
175	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02			
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

C Range: 0 - 360DEG
C Interval: 22.5DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:2.455m [K=1.0000]