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

REPORT

3933 US ROUTE 11, CORTLAND, NEW YORK 13045

Project No. G101925754 Date: December 31, 2014

REPORT NO. 101925754CRT-005

TEST OF ONE LED HIGH BAY

MODEL NO. XT4804LEDOA94WEX/XX/XXXX/XX/FO90

RENDERED TO

SPECTRUM LIGHTING
994 JEFFERSON ST
FALL RIVER, MA 02721

TEST: 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 500567460.

STANDARDS USED: The following American National Standards or Illuminating Engineering Society of North America Test Guides were used in part or totally to test each specimen:

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting

ANSI NEMA ANSLG C78.377: 2012: Specifications of the Chromaticity of Solid State Lighting Products

Energy Star Manufacturer's Guide Version 2.1 (2010): Guide for Qualifying Solid State Lighting Luminaires

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number XT4804LEDOA94WEx/xx/xxxx/xx/FO90. The sample was received by Intertek on December 23, 2014, in undamaged condition and one sample was tested as received. The sample designation was CRT1412231307-001.

DATES OF TESTS: December 30, 2014 through December 30, 2014.

SUMMARY

Model No.:	XT4804LEDOA94WEx/xx/xxxx/xx/FO90
Description:	LED High Bay

	Result	
Criteria	Sphere	Goniometer
Total Lumen Output (Lumens)	4895	4892
Total Power (W)	107.1	106.2
Lumen Efficacy (LPW)	45.7	46.06

Criteria	Result
Power Factor at 120Vac	0.996
Power Factor at 277Vac	0.958
Current ATHD % at 120Vac	7.72
Current ATHD % at 277Vac	14.73
Correlated Color Temperature (CCT - K)	3587
Color Rendering Index (CRI - Ra)	83.4
Color Rendering Index (CRI - R9)	21.6
DUV	0.001
Chromaticity Coordinate (x)	0.399
Chromaticity Coordinate (y)	0.385
Chromaticity Coordinate (u')	0.234
Chromaticity Coordinate (v')	0.508
Maximum In-Situ Source Temperature Point (°C)	77.2

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date
Yokogawa Power Analyzer	WT1600	E474	03/07/14	03/07/15
LABSPHERE 3M	W/ CDS 1100	N307	VBU	VBU
Fluke Temperature Meter	53 II	T1318	03/21/14	03/21/15
Elgar Power Supply	CW1251	---	VBU	VBU
Extech Hygro-Thermometer	445703	T1355	12/10/14	12/10/15
SORENSEN POWER SUPPLY	XFR 150-8	---	VBU	VBU
NIST Spectral Flux Standard Source	RF1024	---	09/18/10	100 hrs of use
LSI High Speed Mirror Goniometer	6440	---	12/16/14	01/16/15
Elgar Power Supply	CW1251	---	VBU	VBU
Yokogawa Power Analyzer	WT210	E464	04/17/14	04/17/15
ExTech Hygro Thermometer	445703	T1357	12/10/14	12/10/15
Fisher Scientific Stopwatch	14-649-9	N1405	08/25/14	08/25/15
M-D Building Products Digital Level	Smart Tool	L112	03/14/14	03/15/15
Extech Hygro-Thermometer	445703	T1355	12/30/13	12/30/14
Fluke Multimeter	87	E259	03/20/14	03/20/15
Fluke Temperature Meter	53 II	N1324	03/21/14	03/21/15

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. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa 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 each sample.

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 stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

Some graphics were created with Photometrics Plus software.

In-Situ Maximum Measured Power Supply Case and LED Source Point Temperature

Power supply case and/or LED source operating temperature measurements were taken on one test sample per model with a thermocouple and Fluke 87 temperature meter. The SSL sample was allowed to reach thermal equilibrium for seven and a half hours before measurements were taken. Power supply or source temperature measurements were measured at the TMPPS or TS point as indicated by the included diagram in accordance with manufacturers declared hot spot location, or at a hot spot location found with a thermal camera when no diagram from the manufacturer is given. The maximum temperature was recorded for the sample. A simulated ceiling or other enclosure may be used in accordance to UL 1598 or UL 153 as applicable.

RESULTS OF TEST

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

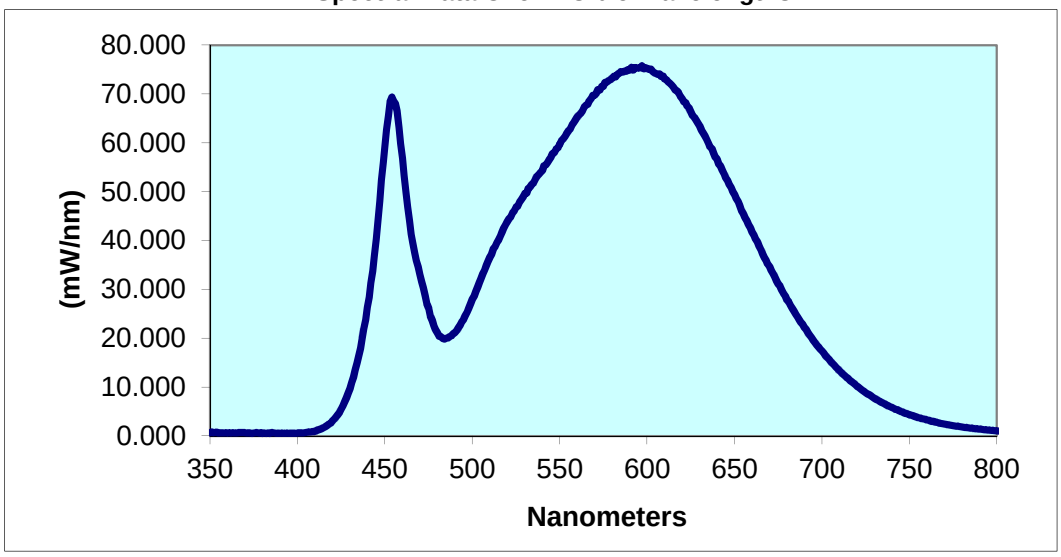
Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)	Luminous Flux (Lumens)	Lumen Efficacy (LPW)
CRT1412231307-001	UP	120.0	895.0	107.1	0.996	7.72	4895	45.7
		277.0	397.3	105.5	0.958	14.73		

Correlated Color Temperature (K)	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity Coordinate	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
3587	83.4	21.6	0.001	0.399	0.385	0.234	0.508

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.693	440	26.280	530	49.600	620	69.030	710	13.360
355	0.600	445	40.320	535	51.780	625	66.410	715	11.710
360	0.622	450	59.410	540	54.340	630	63.480	720	10.190
365	0.567	455	68.610	545	57.050	635	59.930	725	8.838
370	0.690	460	56.830	550	59.720	640	56.640	730	7.691
375	0.608	465	41.280	555	62.530	645	52.920	735	6.679
380	0.527	470	33.100	560	65.360	650	49.340	740	5.813
385	0.643	475	26.080	565	67.720	655	45.480	745	5.016
390	0.530	480	21.120	570	69.790	660	41.750	750	4.358
395	0.559	485	20.000	575	71.620	665	38.080	755	3.770
400	0.578	490	21.170	580	73.270	670	34.670	760	3.263
405	0.709	495	23.880	585	74.570	675	31.090	765	2.829
410	1.001	500	28.020	590	74.910	680	27.870	770	2.461
415	1.745	505	32.150	595	75.300	685	24.840	775	2.129
420	3.068	510	36.580	600	75.230	690	22.180	780	1.839
425	5.463	515	40.090	605	74.180	695	19.640		
430	9.699	520	43.860	610	73.100	700	17.350		
435	16.320	525	46.890	615	71.410	705	15.220		

Spectral Data Over Visible Wavelengths



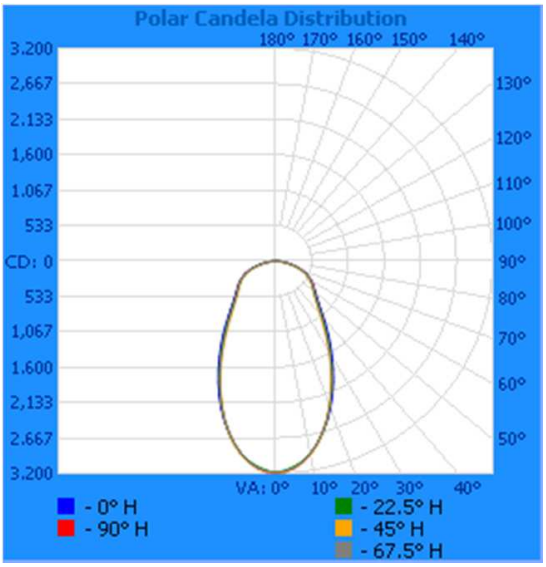
RESULTS OF TEST (cont'd)

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

Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
CRT1412231307-001	UP	120.0	888.2	106.2	0.996	4892	46.06

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	3186	3186	3186	3186	3186
5	3123	3107	3132	3126	3134
10	2949	2942	2960	2945	2950
15	2675	2679	2676	2665	2671
20	2358	2326	2315	2325	2344
25	2009	1963	1928	1951	1977
30	1660	1617	1568	1593	1622
35	1351	1305	1247	1278	1317
40	1086	1052	997	1028	1065
45	889	871	831	852	886
50	764	749	728	740	769
55	678	665	655	666	686
60	606	592	586	598	614
65	525	513	505	519	530
70	424	412	400	415	424
75	305	291	272	288	301
80	185	164	144	153	176
85	71	50	42	45	68
90	0	0	0	0	0

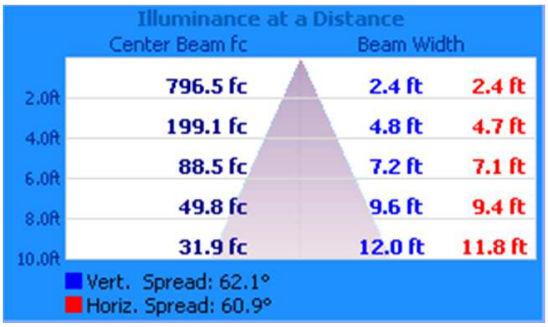


RESULTS OF TEST (cont'd)

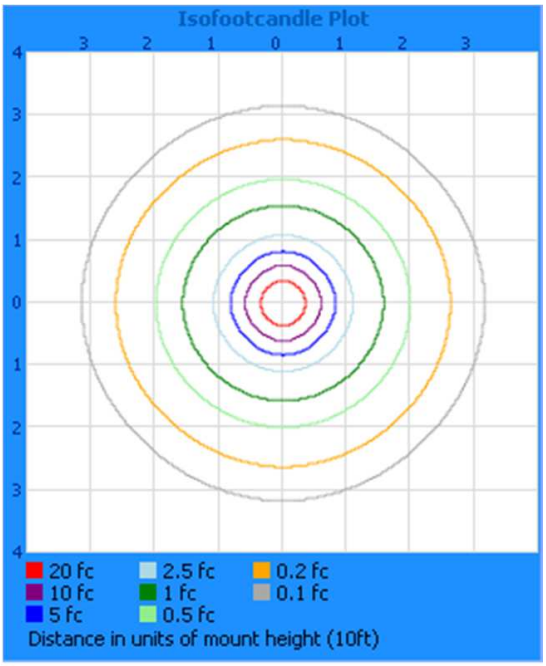
Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	1934	39.5
0-40	2744	56.1
0-60	4014	82.1
60-90	877.3	17.9
0-90	4892	100.0
90-180	0.0	0.0
0-180	4892	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	292.3	6.0
10-20	744.2	15.2
20-30	897.1	18.3
30-40	810.4	16.6
40-50	672.0	13.7
50-60	598.4	12.2
60-70	506.7	10.4
70-80	303.5	6.2
80-90	67.1	1.4

RESULTS OF TEST (cont'd)

In-Situ Maximum Measured LED Source Temperature

Manufacturer Supplied Documentation:

(1) Absolute Maximum Ratings

Item	Symbol	Absolute Maximum Rating	Unit
Forward Current	I_F	180	mA
Pulse Forward Current	I_{FP}	240	mA
Allowable Reverse Current	I_R	85	mA
Power Dissipation	P_D	594	mW
Operating Temperature	T_{opr}	-40~100	°C
Storage Temperature	T_{stg}	-40~100	°C
Junction Temperature	T_J	120	°C

(2) Initial Electrical/Optical Characteristics

Item		Symbol	Condition	Typ	Max	Unit
Forward Voltage		V_F	I_F=65mA	2.9	-	V
R70	Luminous Flux	Φ_v	I_F=65mA	28.6	-	lm
	Luminous Intensity	I_v	I_F=65mA	9.76	-	cd
	Color Rendering Index	R_a	I_F=65mA	73	-	-
R8000	Luminous Flux	Φ_v	I_F=65mA	27.3	-	lm
	Luminous Intensity	I_v	I_F=65mA	9.36	-	cd
	Color Rendering Index	R_a	I_F=65mA	83	-	-
Chromaticity Coordinate	x	-	I_F=65mA	0.41	-	-
	y	-	I_F=65mA	0.39	-	-
Thermal Resistance		$R_{\theta JS}$	-	13	19	°C/W

Item	Rank	Min	Max	Unit
Forward Voltage	-	2.4	3.3	V

Maximum Junction Temperature from LED specification (Tj) = 120°C
Thermal Resistance Formula from LED specification = 19°C/W
Maximum Forward Voltage (Vf) from LED specification = 3.3V
Measured LED Current = 126.2mA
Calculated LED Wattage = Vf x Measured LED Current = 0.417W
Maximum Source Temperature (Ts) = Tj – (LED Wattage x Thermal Resistance) = 112.1°C

Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature (°C)
CRT1412231307-001	77.2	Per diagram	112.1

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:

Gerald Gray
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Lighting Division

Report Reviewed By:

Jeffrey Davis
Engineering Manager
Lighting Division

Attachment: None