



FOR THE SCOPE OF
ACCREDITATION UNDER NVLAP
LAB CODE 200849-0

TEST REPORT

Job No. 140100765SHA

Date: March 05 2014

REPORT NO. 140100765SHA-001

TEST OF ONE High-Bay Luminaires for Commercial and Industrial Buildings

MODEL NO. EPL-HB-150LED-RT

RENDERED TO

Larson Electronics, LLC
Kemp, Texas 75143 USA

TEST: Luminaire Efficacy, Minimum Light Output, Zonal Lumen Density, Color Rendering Index, Correlated Color Temperature, Lumen maintenance, Electrical measurements and Temperature tests to DesignLights Consortium V2.1.

STATEMENT OF LIMITATION: The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, INST, or any agency of the federal government.

LABORATORY NOTE: The laboratory that conducted the testing detailed in this report has been Qualified, Verified, and Recognized for LM-79 Testing for ENERGY STAR for Luminaires by NVLAP program.

AUTHORIZATION: The testing performed was authorized by signed quote number QSH131216024.

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:

DesignLights Consortium V2.0
NEMA ANSLG C78.377: 2008
IESNA LM-79: 2008

ANSI C82.77-2002

CIE No. 13.3 – 1995

IESNA LM-16: 1993
UL 1598: 2008

Qualification Requirements for Luminaires (Light Fixtures)
Specifications of the Chromaticity of Solid State Lighting Products
Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products
Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment
Method of Measuring and Specifying Colour Rendering Properties of Light Sources
Practical Guide to Colorimetry of Light Sources
Standard for Safety: Luminaires

DESCRIPTION OF SAMPLE: The client submitted two samples of the series. The samples were received by Intertek (SHANGHAI) on Jan. 14 2014, in undamaged condition, and three samples were tested as received. The sample designations were 0140114-40-001 through 0140114-40-002.

DATES OF TESTS: February 11 2014 through March 05 2014

ISSUED BY: Intertek Testing Services Shanghai

TEST LOCATION: 7 floor, No.51, 1089 Qinzhou Road (North), Shanghai, China 200233

***** End of Page *****

Intertek Testing Services Shanghai Limited

Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China.
Tel: 86 21 61278200 Fax: 86 21 54262361 Website: www.intertek-etlsemko.com

SUMMARY

Model Number :	EPL-HB-150LED-RT
Description :	Fixed Luminaire
DLC category :	High-Bay Luminaires for Commercial and Industrial Buildings
Use :	Commercial

Criteria	Result	Status
Luminaire Efficacy	95,47 Lm/W	Complies
Luminaire Light Output	12955 Lm	Complies
Luminaire Zonal Lumen Density in 20-50° Zone	61,4%	Complies
Lumen Maintenance	L ₇₀ ≥ 35000 h	Complies
Correlated Color Temperature(CCT)	5010K	Complies for 5000K
Color Rendering Index(CRI)	71,7	Complies
Power factor	0,99	Complies
Maximum LED Source In-Situ Temperature	84°C	Complies
Duv		0.001

*Note: Only verbal confirmation received regarding maximum rating.

***** End of Page *****



For High-Bay Luminaires for Commercial and Industrial Buildings	
Criteria Measured	Specified Value

Correlated Color Temperature (CCT)	Contain one of the following designated CCTs	
	Nominal CCT (K) on package	CCT (K) Range
	2700K	2725 ± 145
	3000K	3045 ± 175
	3500K	3465 ± 245
	4000K	3985 ± 275
	4500K	4503 ± 243
	5000K	5028 ± 283
Allowable CCTs	≤5700K	
Minimum CRI	≥ 70	
Power Factor	≥ 0.90	
Total Harmonic Distortion	≤ 20%	
Minimum Luminaire Efficacy	80 lm/W	
Zonal Lumen Density	Minimum of 30% of total lumens within the 20-50° zone	
Maximum Measured Power Supply Case Or Manufacturer Designated Temperature Measurement Point (TMP _{ps})	Not to exceed power supply manufacturer maximum recommended case temperature or TMP when measured insitu.	
L ₇₀ Lumen Maintenance	≥ 35000 hrs	
Minimum Luminaire Warranty	≥ 5 years	

***** End of Page *****



Report No. 140100765SHA-001

Page 4 of 12

Date: March 05 2014

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Calibration Due Date
Fluke Temperature Meter	52	EC4842	2014/04/26
Everfine- DC Power Supply	WY12010	EC4753-7	2014/08/01
Everfine- AC power source for Integrating Sphere System	VPS1010 PWM	EC4760-12	2014/08/01
Everfine - AC power source for Goniophotometer System	VPS1060 PWM	EC4753-8	2014/08/01
Two meter integrating sphere unit	Everfine – 2M	EC4760	---
Everfine - Digital Power Meter	PF2010A	EC4760-10	2014/08/01
YOKOGAWA - Digital Power Meter	WT210	EC4553	2014/08/01
Everfine – Goniophotometer	Go-R5000	EC4753	2014/10/31

***** End of Page *****



TEST METHOD

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79

Photometric and Electrical measurements – Distribution Method

Light Distribution was measured using a Go-R5000 Type-C Rotating Mirror Goniophotometer. Temperature 25°C and relative humidity of 60% was measured at a position in the testing laboratory.

The lamp rotates only around the fixed vertical axle in the prescribed burning position. The lamp and mirror permit the measurement of luminous intensity at the direction of any horizontal or vertical angle without tilting the lamp. The lamp was allowed to stabilize before measurements were made.

Photometric and Electrical Measurements – Integrating Sphere Method

Total light output (luminous flux) was measured using a 2 meters integrating sphere spectral lamp measurement system. Temperature was measured at a position inside the sphere shielded from direct light. Relative humidity of 65% was measured at a position in the testing laboratory.

Spectral radiant flux measurements were made using spectroradiometer attached to the detector port of the integrating sphere. Each lamp was allowed to stabilize before measurements were made. The calibration of the integrating sphere spectroradiometer system is by the reference/standard lamps which are traceable to National Institute of Metrology P.R. CHINA. Lamp efficacy (lumens per watt) for each lamp model was then computed based on the luminous flux result. Electrical measurements including voltage, power and power factor were measured using Everfine - Digital Power Meter., model PF2010A .

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

Power supply case and/or led source operating temperature measurements were taken on one test sample per model with a thermocouple and Fluke 52 temperature meter. The SSL sample was allowed to reach thermal equilibrium for seven hours before measurements were taken. Power supply or source temperature measurements were measured at the TMP_{PS} or T_S 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 as applicable.

***** End of Page *****

TEST METHOD (cont'd)RESULTS OF TESTSPhotometric Measurements at 25°C – Integrating Sphere Method

Intertek Sample No.	Base Orientation	Correlated Color Temperature (K)	CRI	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
0140114-40-001	N/A	5010	71,7	0,3459	0,3633	0,2075	0,4904

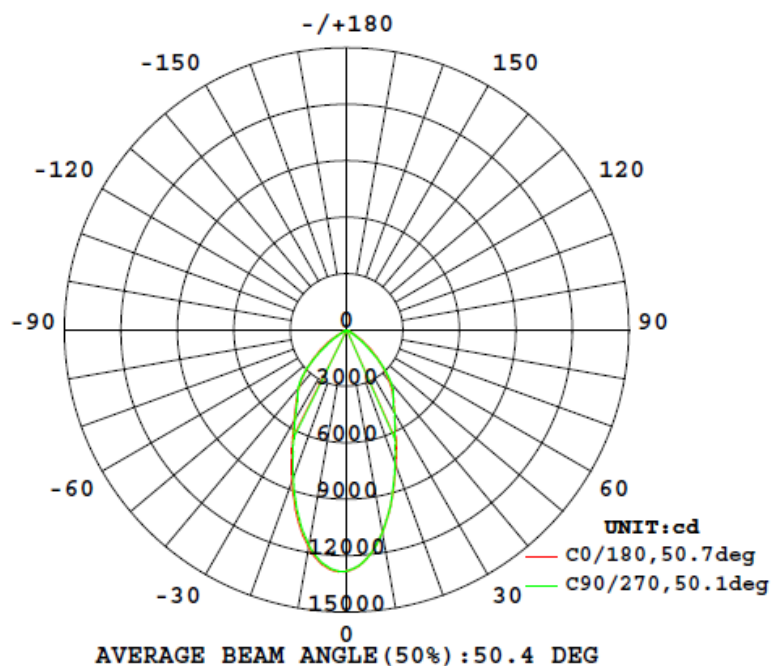
Photometric and Electrical Measurements at 25°C – Distribution Method

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)
0140114-40-001	N/A	120,0	1148	136,1	0,99	12995	95,47

***** End of Page *****

Intensity (Candlepower) Summary at 25°C - Candelas

V \ H(°)	0	22.5	45	67.5	90
0	12792.2	12795.8	12792.4	12782.2	12826.8
5	12196.6	12318.7	12403.0	12497.9	12653.5
10	10925.2	11120.8	11281.7	11468.5	11720.8
15	9261.0	9481.0	9688.9	9913.2	10239.3
20	7553.6	7751.6	7951.2	8190.7	8519.8
25	6115.1	6273.5	6410.2	6609.7	6915.7
30	5071.8	5145.6	5223.4	5413.3	5631.7
35	4320.5	4338.3	4403.4	4557.0	4703.0
40	3666.2	3462.9	3489.4	3942.1	3994.4
45	2652.8	2387.9	2420.8	3071.1	3155.3
50	1517.3	1455.0	1519.1	1934.5	2211.6
55	766.8	817.3	876.6	983.5	1382.4
60	290.1	325.5	357.6	414.8	578.7
65	145.6	147.5	148.0	159.7	180.5
70	81.9	95.2	96.3	103.1	107.2
75	54.8	59.0	59.9	59.4	54.9
80	37.4	42.2	42.3	40.7	38.5
85	10.0	15.9	18.6	16.8	21.0
90	0.0	0.0	0.0	0.0	1.7



***** End of Page *****

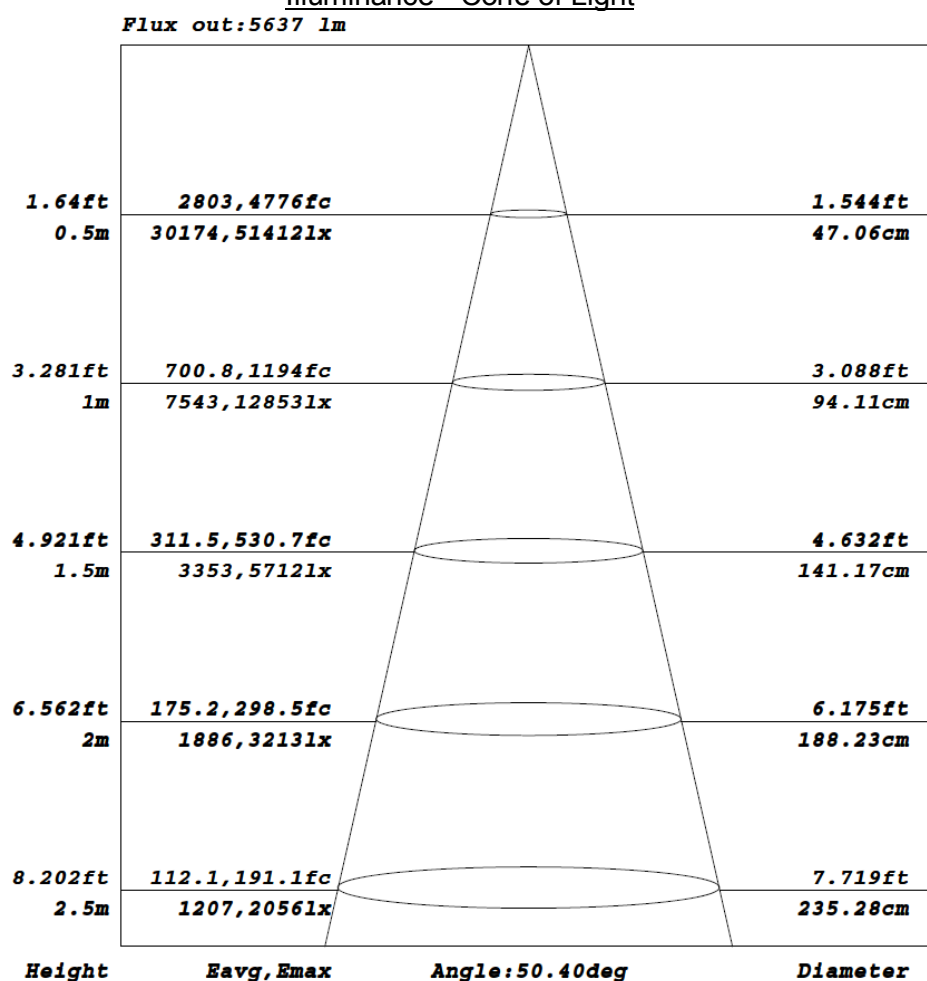
RESULTS OF TESTS (cont'd)Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
20-50	7977	61,4%

Illumination Plots

Model No.: EPL-HB-150LED-RT

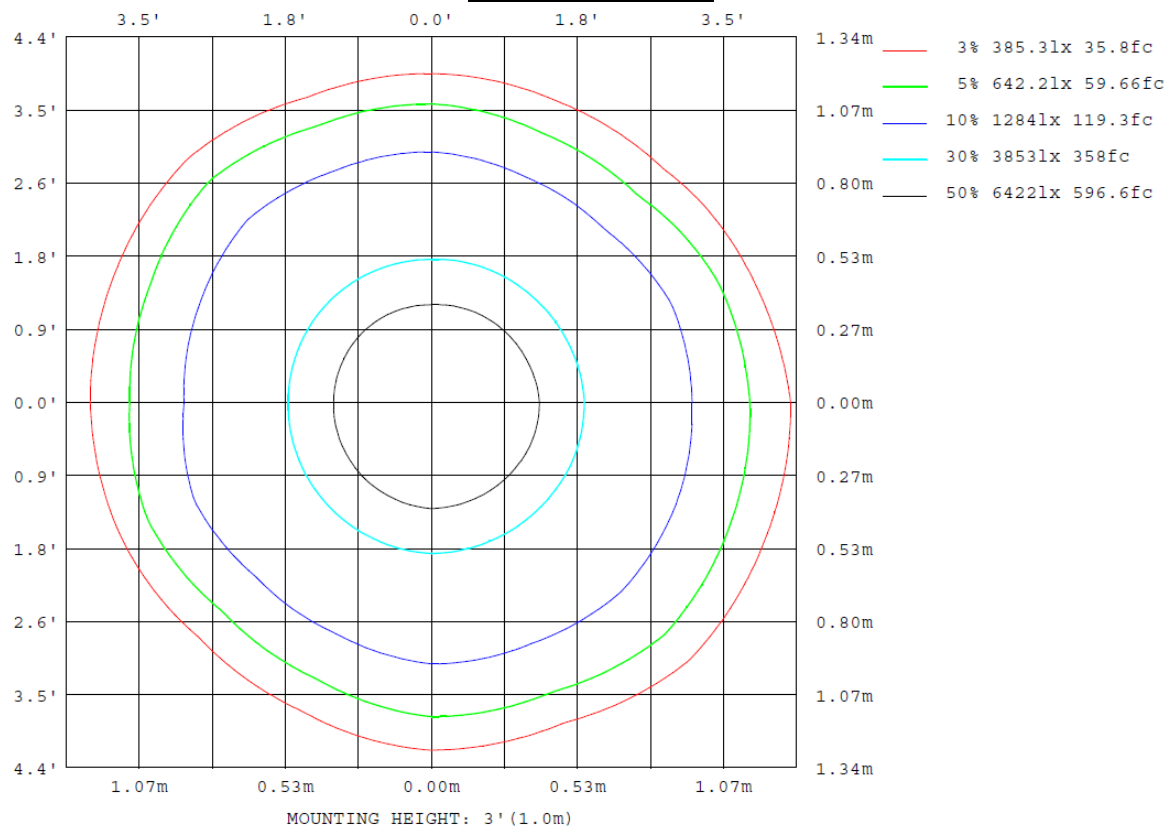
Mount Height: 2,5m

Illuminance - Cone of Light

***** End of Page *****



Model No.: EPL-HB-150LED-RT
Mount Height: 1,0m
Isoillumination Plot



***** End of Page *****

Power Factor

Intertek Sample No.	Under 120V	Under 277V
0140114-40-001	0,99	0,89 (within -3% tolerance)

Total Harmonic Distortion

Test Condition	Total Harmonic Distortion(%)
EPL-HB-150LED-RT	
120V	13,43
277V	16,15

Minimum Luminaire Warranty

Intertek Sample No.	Minimum Luminaire Warranty(Years)
EPL-HB-150LED-RT	
0140114-40-001	5

In-Situ Maximum Measured LED Source Point Temperature

Maximum Junction Temperature from LED specification (T_j) = 115 °C

Thermal Resistance Formula from LED specification = 1,5 °C/W

Maximum Forward Voltage (V_f) from LED specification = 26 V

Measured LED Current = 469,6 mA

Calculated LED Wattage = $V_f \times$ Measured LED Current = 12,20 W

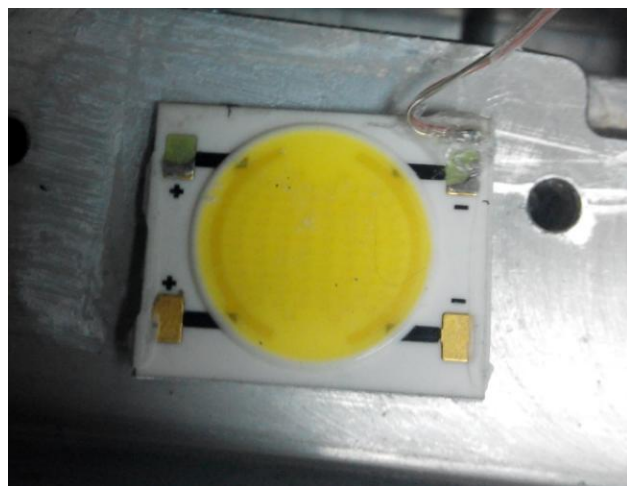
Maximum Source Temperature (T_s) = $T_j - (\text{LED Wattage} \times \text{Thermal Resistance}) = 96,7 \text{ } ^\circ\text{C}$

Absolute Maximum Ratings at $T_A=25^\circ\text{C}$

Parameter	White	Units
Power dissipation	20	W
DC Forward Current	800	mA
Peak Forward Current [1]	1000	mA
ESD Sensitivity	2000	V
Junction temperature	115	°C
Soldering temperature	260	°C
Manual Soldering time at 260°C(Max)	5	sec
Operating Temperature Range	-20°C To +85°C	
Storage Temperature Range	-40°C To +100°C	

Symbol	Parameter	Device	Min.	Typ.	Max.	Units	Test Conditions
V _F	Forward Voltage (1)	White	22	24	26	V	I _F =480mA

***** End of Page *****

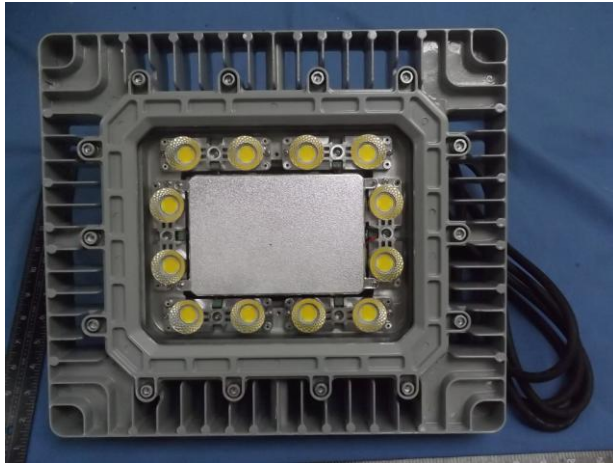
Manufacturer Supplied Documentation:
LED Chip identified as HONGLITRONIC
In-Situ Picture – Ts point


Intertek Sample No.	Model no.	Maximum Measured Source Temperature (°C)	Maximum Rated Source Temperature (°C)
0140114-40-001	EPL-HB-150LED-RT	84	96,7

Lumen Maintenance

		TM-21 Report	
Table 1: Report at each LM-80 Test Condition		Table 2: Interpolation Report (projection based on <i>in-situ</i> temperature entered)	
Description of LED Light Source Tested (manufacturer, model, catalog number)		HONGLITRONIC MODEL HL-LB019H358W-10B10C8	
Test Condition 1 - 55°C Case Temp		Test Condition 2 - 85°C Case Temp	
Sample size	15	Sample size	15
Number of failures	0	Number of failures	0
DUT drive current used in the test (mA)	480	DUT drive current used in the test (mA)	480
Test duration (hours)	6,000	Test duration (hours)	6,000
Test duration used for projection (hour to hour)	1,000 - 6,000	Test duration used for projection (hour to hour)	1,000 - 6,000
Tested case temperature (°C)	55	Tested case temperature (°C)	85
α	6.228E-06	α	8.302E-06
B	1.006	B	1.008
Calculated L70(6k) (hours)	58,000	Calculated L70(6k) (hours)	44,000
Reported L70(6k) (hours)	>33000	Reported L70(6k) (hours)	>33000
		Sample size	-
		Number of failures	-
		DUT drive current used in the test (mA)	-
		Test duration (hours)	-
		Test duration used for projection (hour to hour)	-
		Tested case temperature (°C)	-
		α	-
		B	-
		Calculated L70(6k) (hours)	-
		Reported L70(6k) (hours)	-
		$T_{s,1}$ (°C)	55.00
		$T_{s,1}$ (K)	328.15
		α_1	6.228E-06
		B_1	1.006
		$T_{s,2}$ (°C)	85.00
		$T_{s,2}$ (K)	358.15
		α_2	8.302E-06
		B_2	1.008
		E_g/k_0	1.13E+03
		A	1.925E-04
		B_0	1.007
		$T_{s,i}$ (°C)	84.00
		$T_{s,i}$ (K)	357.15
		α_i	8.229E-06
		Projected L70(6k) at 84°C (hours)	44,000
		Reported L70(6k) at 84°C (hours)	>33000

***** End of Page *****

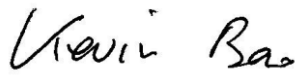
RESULTS OF TESTS (cont'd)Product Picture (not to scale)

EPL-HB-150LED-RT

In Charge Of Tests:


Jimmy Wang
Project Engineer

Report Reviewed By:


Kevin Bao
Reviewer

Attachment: None

***** End of Report *****