

LM-79 Reporting

Laboratory Information

| | |
|-------------------------|------------------------------|
| Name of test lab | Intertek |
| Date of test report | July 31 st , 2013 |
| Test report number | 101235726CRT-001 |
| Laboratory contact name | Vladimir Kozak |

Product Information

| | |
|------------------------------------|-----------------|
| Manufacturer | HEICO lighting™ |
| Brand name | Virgolite |
| Model number | H1947.000 |
| Number of units (modular products) | 1 |

Electrical Measurements (input to LMPS-350 power supply with full load configuration)

| | Integrating Sphere Output | Goniophotometer Output | |
|-----------------|---------------------------|------------------------|-----|
| Input wattage | 42.63 | 39.44 | W |
| Input current | 362.8 | 335.6 | mA |
| Input voltage | 120.0 | 120.0 | Vac |
| Power factor | 0.979 | 0.979 | |
| Off-state power | N/A | N/A | W |

Photometric Characteristics

| | | | |
|------------------------------------|-------|-------|------|
| Total initial lumen output | 149.6 | 146.3 | lm |
| Initial luminaire efficacy | 95.90 | | lm/W |
| Correlated color temperature (CCT) | 3608 | | K |
| Color rendering index (CRI) | 85.6 | | |
| R9 value | 28.1 | | |
| Duv | 0.002 | | |

Luminous Intensity Distribution

| | | |
|-----------------------------------|------|---|
| Zonal lumens in the 0° -60° zone | 81.7 | % |
| Zonal lumens in the 60° -90° zone | 18.3 | % |
| Zonal lumens in the 0° -90° zone | 100 | % |



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

REPORT

3933 US ROUTE 11 CORTLAND, NEW YORK 13045

Project No. G100557536

Date: July 31, 2013

REPORT NO. 101235726CRT-001

TEST OF ONE VIRGO+™ LS4 3500K LED MODULE

LED MODULE MODEL NO. H1947.000
DRIVER MODEL NO. LMPS-350 1006.69

RENDERED TO

HEICO LIGHTING™
400 du PARC
ST-EUSTACHE, QUEBEC
CANADA, J7R 0A1

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 500436155.

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 Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products

ANSI NEMA ANSLG C78.377: 2008 Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted 25 production samples of model number H1947.000. The samples were received by Intertek on June 24, 2013, in undamaged condition, and one sample was tested as received. The sample designation was CRT1306241043-001A.

DATES OF TESTS: July 26, 2013 through July 30, 2013.

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SUMMARY

| | |
|--------------|---|
| Model No.: | H1947.000 |
| Description: | Virgo+™ LS4 3500K |
| Test Note: | Testing performed on one LED module with 24 additional modules connected to the power supply for proper loading per client request. |

| Criteria | Result |
|------------------------------------|--------------|
| Module Lumen Output | 149.6 Lumens |
| Output Power per Module (W)* | 1.56 |
| Module Efficacy (Lm/W) | 95.90 |
| Full Kit Input Power Factor | 0.979 |
| Full Kit Input Current ATHD | 9.27 % |
| Correlated Color Temperature (CCT) | 3608 K |
| Color Rendering Index (CRI) – Ra | 85.6 |
| Color Rendering Index (CRI) - R9 | 28.1 |
| Duv | 0.002 |
| Chromaticity Coordinate (x) | 0.397 |
| Chromaticity Coordinate (y) | 0.381 |
| Chromaticity Coordinate (u') | 0.234 |
| Chromaticity Coordinate (v') | 0.506 |

*TEST NOTE: Output Power per Module was calculated by dividing total Output Power by number of modules in full kit.

EQUIPMENT LIST

| Equipment Used | Model Number | Control Number | Last Calibration Date | Calibration Due Date |
|------------------------------------|--------------|----------------|-----------------------|----------------------|
| Leeds & Northup Standard Resistor | Manganin | Y089 | 02/07/13 | 02/07/14 |
| Data Precision Digital Voltmeter | 3600 | V124 | 02/07/13 | 02/07/14 |
| Fluke Multimeter | 45 | M133 | 02/07/13 | 02/07/14 |
| Kikusui DC Power Supply | 35-10L | E160 | N/A | N/A |
| Sorenson DC Power Supply | DLM150-20E | N/A | N/A | N/A |
| NIST Spectral Flux Standard Source | RF1024 | N/A | 9/18/2010 | 100 hrs of use |
| ITS 2 Meter Integ. Sphere | --- | N308 | VBV | VBV |
| Labsphere Diode Array | CDS 600 | W/N308 | 07/01/13 | 08/01/13 |
| Xitron Power Analyzer | 2503AH | E235 | 05/10/13 | 06/10/14 |
| Fluke Temp Meter | 52 | T801 | 09/07/12 | 09/07/13 |
| Extech Hygro-Thermometer | 445703 | T1366 | 11/8/12 | 11/08/13 |
| Elgar AC power supply | CW1251 | --- | --- | --- |
| LSI High Speed Mirror Goniometer | 6440 | --- | 07/24/13 | 08/24/13 |
| Elgar Power Supply | CW1251 | --- | VBV | VBV |
| Yokogawa Power Analyzer | WT210 | E464 | 04/17/13 | 04/17/14 |
| Extech Hygro Thermometer | 445703 | T1359 | 11/08/12 | 11/08/13 |
| Fisher Scientific | --- | N1132 | 04/22/13 | 04/22/14 |
| M-D Building Products | Smart Tool | L112 | 02/13/13 | 02/13/14 |
| Yokogawa Power Analyzer | WT1600 | E462 | 07/17/13 | 07/17/14 |

TEST METHODS

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79.

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.

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.

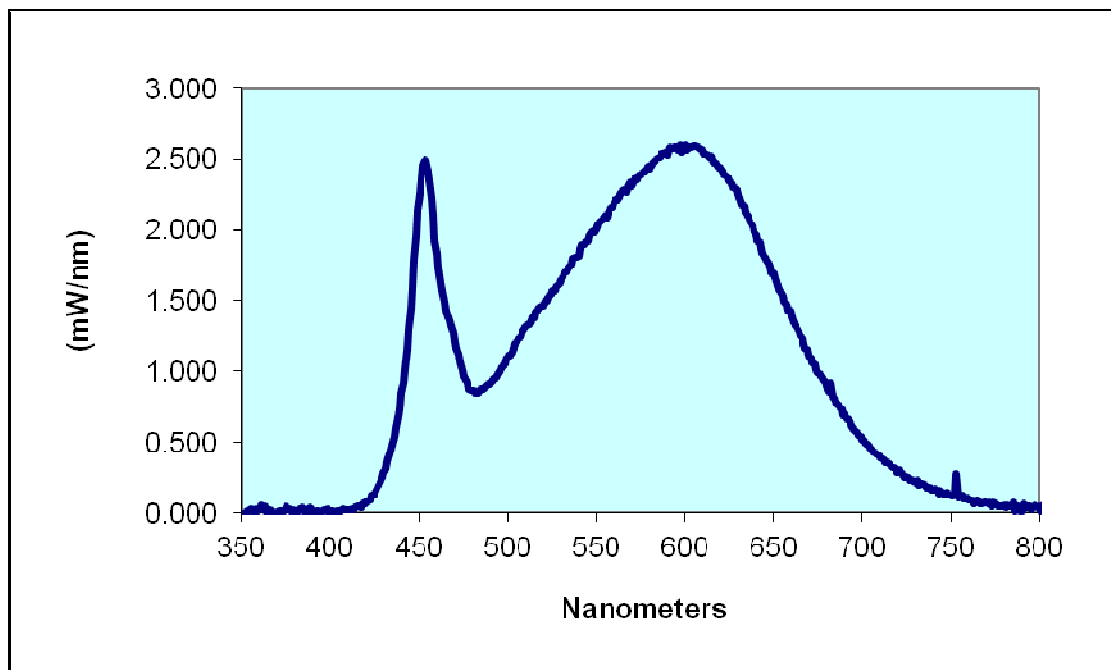


RESULTS OF TESTS

Spectral Distribution over Visible Wavelengths

| nm | mW/nm | nm | mW/nm | nm | mW/nm | nm | mW/nm |
|-----------|-------|-----|-------|-----|-------|-----|-------|
| H1947.000 | | | | | | | |
| 350 | 0.000 | 460 | 1.834 | 570 | 2.312 | 680 | 0.871 |
| 355 | 0.034 | 465 | 1.433 | 575 | 2.389 | 685 | 0.771 |
| 360 | 0.021 | 470 | 1.205 | 580 | 2.437 | 690 | 0.701 |
| 365 | 0.020 | 475 | 0.965 | 585 | 2.512 | 695 | 0.597 |
| 370 | 0.005 | 480 | 0.862 | 590 | 2.529 | 700 | 0.513 |
| 375 | 0.046 | 485 | 0.877 | 595 | 2.584 | 705 | 0.456 |
| 380 | 0.005 | 490 | 0.912 | 600 | 2.596 | 710 | 0.394 |
| 385 | 0.008 | 495 | 0.996 | 605 | 2.589 | 715 | 0.348 |
| 390 | 0.000 | 500 | 1.108 | 610 | 2.541 | 720 | 0.284 |
| 395 | 0.006 | 505 | 1.208 | 615 | 2.516 | 725 | 0.256 |
| 400 | 0.011 | 510 | 1.315 | 620 | 2.437 | 730 | 0.213 |
| 405 | 0.015 | 515 | 1.381 | 625 | 2.341 | 735 | 0.195 |
| 410 | 0.020 | 520 | 1.464 | 630 | 2.244 | 740 | 0.161 |
| 415 | 0.049 | 525 | 1.570 | 635 | 2.102 | 745 | 0.145 |
| 420 | 0.086 | 530 | 1.647 | 640 | 1.968 | 750 | 0.129 |
| 425 | 0.148 | 535 | 1.738 | 645 | 1.812 | 755 | 0.116 |
| 430 | 0.287 | 540 | 1.820 | 650 | 1.689 | 760 | 0.092 |
| 435 | 0.481 | 545 | 1.925 | 655 | 1.531 | 765 | 0.000 |
| 440 | 0.849 | 550 | 2.015 | 660 | 1.382 | 770 | 0.078 |
| 445 | 1.444 | 555 | 2.104 | 665 | 1.255 | 775 | 0.065 |
| 450 | 2.259 | 560 | 2.198 | 670 | 1.115 | 780 | 0.060 |
| 455 | 2.418 | 565 | 2.275 | 675 | 0.992 | | |

HEICO LIGHTING
Sample No. CRT1306241043-001A
Model No. H1947.000
Spectral Data Over Visible Wavelengths





RESULTS OF TESTS (cont'd)

Electrical Measurements at 25°C – Integrating Sphere Method - Full Kit

| Intertek Sample No. | Base Orientation | Input Voltage (Vac) | Input Current (mA) | Input Power (Watts) | Input Power Factor | Current ATHD (%) |
|---------------------|------------------|---------------------|--------------------|---------------------|--------------------|------------------|
| H1947.000 | | | | | | |
| CRT1306241043-001A | UP | 120.0 | 362.8 | 42.63 | 0.979 | 9.27 |

| Intertek Sample No. | Driver Output Voltage (Vrms) | Driver Output Current (Amps) | Driver Output Power (Watts) |
|---------------------|------------------------------|------------------------------|-----------------------------|
| CRT1306241043-001A | 10.13 | 4.12 | 39.01 |

Photometric and Electrical Measurements at 25°C – Integrating Sphere Method - Individual Module

| Intertek Sample No. | Output Power (Watts)* | Absolute Luminous Flux (Lumens) | Lumen Efficacy (Lumens Per Watt) |
|---------------------|-----------------------|---------------------------------|----------------------------------|
| CRT1306241043-001A | 1.56 | 149.6 | 95.90 |

*TEST NOTE: Output Power per Module was calculated by dividing total Output Power by number of modules in full kit.

| Intertek Sample No. | Correlated Color Temperature (K) | CRI -Ra | CRI -R9 | DUV | CIE 31' Chromaticity Coordinate (x) | CIE 31' Chromaticity Coordinate (y) | CIE 76' Chromaticity Coordinate (u') | CIE 76' Chromaticity Coordinate (v') |
|---------------------|----------------------------------|---------|---------|-------|-------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| CRT1306241043-001A | 3608 | 85.6 | 28.1 | 0.002 | 0.397 | 0.381 | 0.234 | 0.506 |



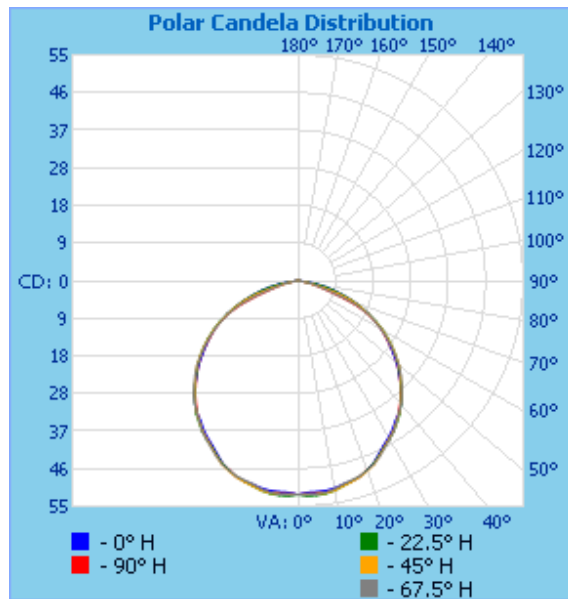
RESULTS OF TESTS (cont'd)

Photometric and Electrical Measurements – Distribution Method

| Intertek Sample No. | Base Orientation | Input Voltage (Vac) | Input Current (mA) | Input Power (Watts) | Input Power Factor |
|---------------------|------------------|---------------------|--------------------|---------------------|--------------------|
| H1947.000 | | | | | |
| CRT1306241043-001A | UP | 120.1 | 335.6 | 39.44 | 0.979 |

Intensity (Candlepower) Summary at 25°C - Candelas

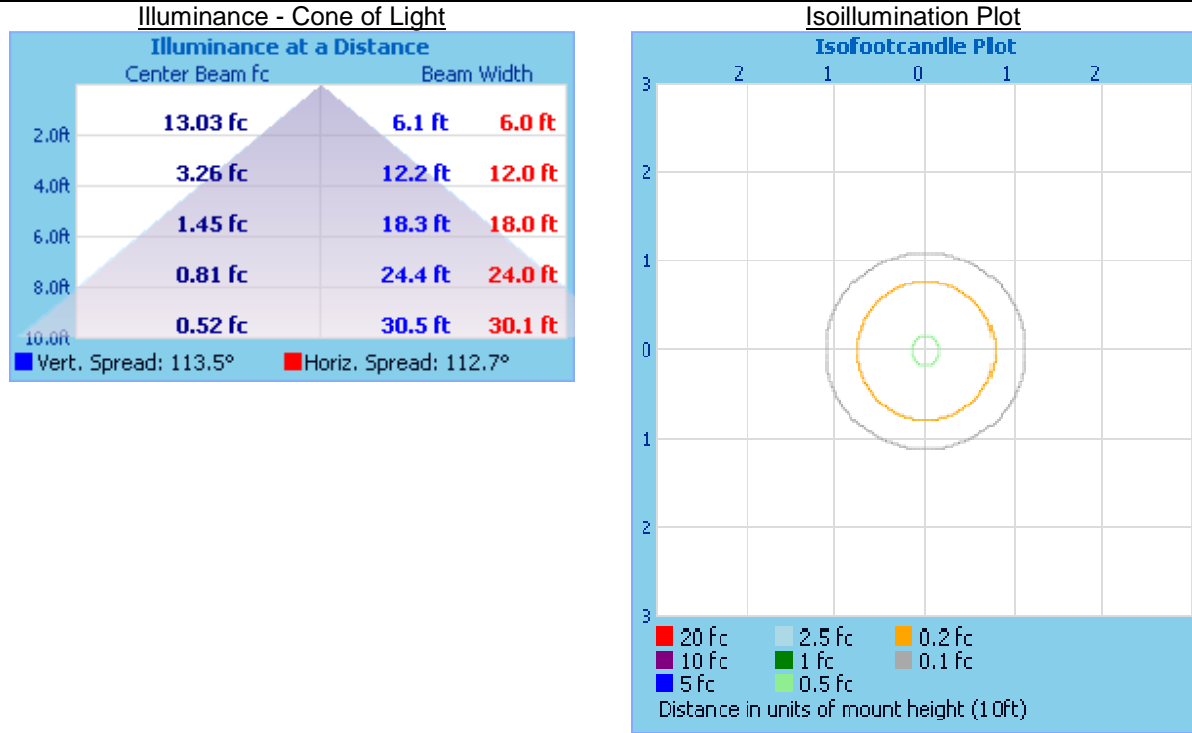
| Angle | 0 | 22.5 | 45 | 67.5 | 90 |
|-----------|----|------|----|------|----|
| H1947.000 | | | | | |
| 0 | 52 | 52 | 52 | 52 | 52 |
| 5 | 52 | 52 | 52 | 52 | 52 |
| 10 | 51 | 52 | 52 | 52 | 52 |
| 15 | 50 | 51 | 51 | 50 | 51 |
| 20 | 49 | 49 | 49 | 49 | 49 |
| 25 | 47 | 47 | 47 | 47 | 47 |
| 30 | 44 | 45 | 44 | 45 | 44 |
| 35 | 42 | 42 | 42 | 42 | 42 |
| 40 | 39 | 39 | 39 | 39 | 39 |
| 45 | 35 | 36 | 36 | 36 | 35 |
| 50 | 32 | 32 | 32 | 32 | 32 |
| 55 | 28 | 28 | 28 | 28 | 27 |
| 60 | 24 | 24 | 24 | 23 | 23 |
| 65 | 19 | 19 | 19 | 18 | 18 |
| 70 | 14 | 14 | 14 | 11 | 10 |
| 75 | 9 | 9 | 6 | 5 | 5 |
| 80 | 5 | 4 | 2 | 2 | 2 |
| 85 | 1 | 0 | 0 | 0 | 0 |
| 90 | 0 | 0 | 0 | 0 | 0 |



RESULTS OF TESTS (cont'd)

Illumination Plots

Model No.: H1947.000
 Mounting Height: 10 ft.



Zonal Lumen Summary and Percentages at 25°C

| Zone | Lumens | % Luminaire |
|-----------|--------|-------------|
| H1947.000 | | |
| 0-30 | 40.9 | 27.9 |
| 0-40 | 67.1 | 45.9 |
| 0-60 | 119.5 | 81.7 |
| 60-90 | 26.8 | 18.3 |
| 0-90 | 146.3 | 100.0 |
| 90-180 | 0.0 | 0.0 |
| 0-180 | 146.3 | 100.0 |

Picture (not to scale)



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.

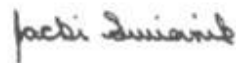
In Charge Of Tests:



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Attachment: None

Report Reviewed By:



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