

Test Report

Report Number: L14173

Date: Jan 15, 2015

Issued by:

Dialight Optics Laboratory
1501 Route 34 South, Farmingdale, NJ 07727

Test of one Vigilant Highbay With Polycarbonate Dome Lens
Unit manufacturer: Dialight Corporation
Unit model number: HELRC4GN-xxx

Issued to:

Dialight Corporation
1501 Route 34 South, Farmingdale, NJ 07727

Tests performed: Photometric characterization and temperature measurement per the described standards.

Dates of test: January 13, 2015 through January 15, 2015

Standards Used: All tests are performed in accordance with procedures and guidelines prescribed by the American National Standards Institute (ANSI) or Illuminating Engineering Society of North America (IES):

- IES LM-79:2008: Electrical and Photometric Measurements of Solid-State Lighting Products
- ANSI/UL 1598:2008: Underwriters Laboratories Inc. Standard for Safety: Luminaires
- ENERGY STAR Manufacturer's Guide for Qualifying Solid State Lighting Luminaires Version 2.1

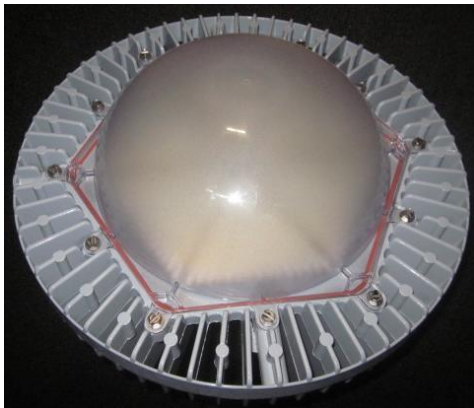
Description of sample:

Sample Number: L14173
Manufacturer: Dialight Corporation
Product Name: Vigilant
Description: Vigilant Highbay With Polycarbonate Dome Lens
Model Number: HELRC4GN-xxx

Report Summary

Sample number L14173
Dialight unit model number HELRC4GN-xxx

Photograph(s) of sample:



*Photographs not to scale. For reference only.

Summary of Results:

| | <u>Integrating Sphere</u> | <u>Goniophotometer</u> |
|--------------------|---------------------------|------------------------|
| Luminous Flux: | 12650 (lumens) | 12509 (lumens) |
| Electrical Power: | 112.2 (W) | 112.2 (W) |
| Luminous Efficacy: | 112.9 (lumens/W) | 111.5 (lumens/W) |

Electrical Measurements:

Input Power (120VAC): 112.2 (W)
 Power Factor (120VAC): 0.993
 Current ATHD % (120VAC): 9.108
 Input Power (277VAC): 110.8 (W)
 Power Factor (277VAC): 0.938
 Current ATHD % (277VAC): 16.3

Color Measurements:

Correlated Color Temperature (CCT): 4924
 Color Rendering Index (CRI): 78.5
 Chromaticity Coordinate (x): 0.3477
 Chromaticity Coordinate (y): 0.3569
 Chromaticity Coordinate (u'): 0.2111
 Chromaticity Coordinate (v'): 0.3251
 DUV: 0.0016

Temperature Measurements:

In Situ LED Source Temperature: 50.9 (°C)

Test Results: Integrating Sphere

Results include unit color, flux, efficacy and electrical power for sample number L14173.
Dialight unit model number HELRC4GN-xxx

Test Conditions:

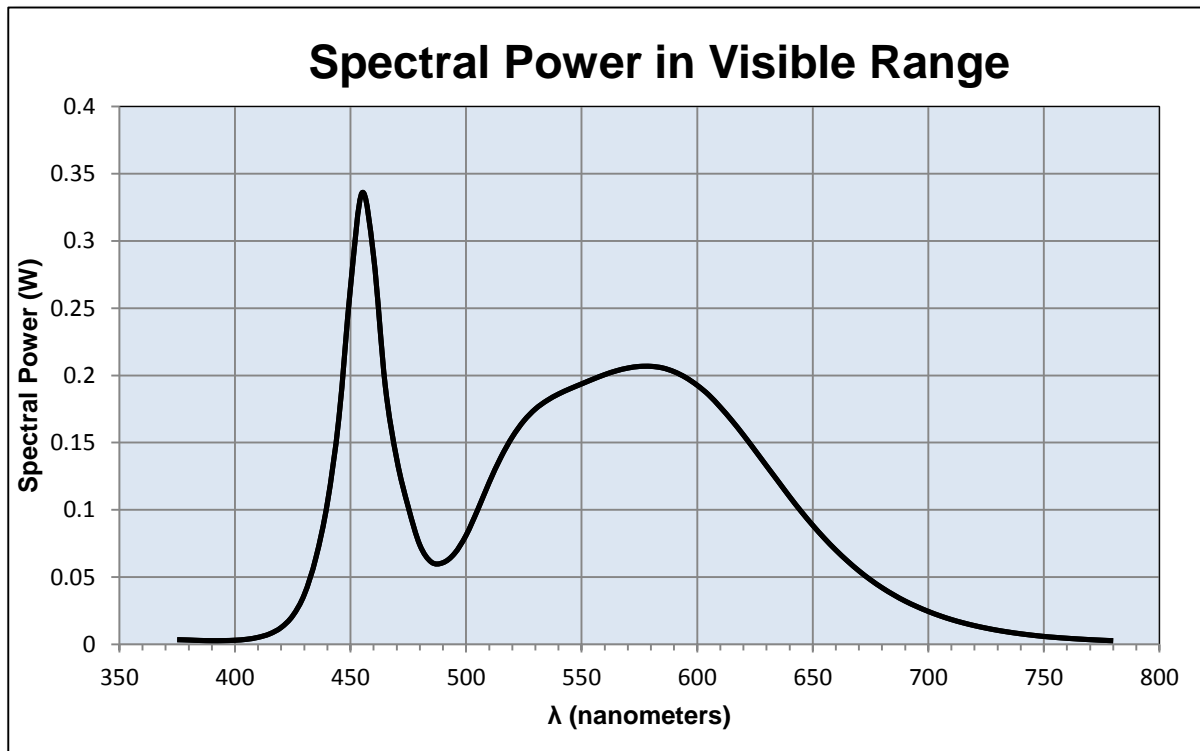
Ambient Temperature: 25 ± 1 (°C)

Electrical Measurements:

Input Voltage: 120 (VAC)
Input Current: 0.94 (A)
Input Power: 112.2 (W)
Input Power Factor: 0.993
Current ATHD: 9.108 (%)

Photometric measurements:

Luminous Flux: 12650 (lumens)
Luminous Efficacy: 112.9 (lumens/W)
Correlated Color Temperature (CCT): 4924 (K)
CRI -Ra: 78.5
CRI -R9: -5.8
DUV: 0.0016
CIE Coordinate (x): 0.3477
CIE Coordinate (y): 0.3569
CIE Coordinate (u'): 0.2111
CIE Coordinate (v'): 0.3251



Test Results: Integrating Sphere

Results continued from previous page.

Tabulated Spectral Power in Visible Range:

| $\lambda(\text{nm})$ | (W/nm) | $\lambda(\text{nm})$ | (W/nm) | $\lambda(\text{nm})$ | (W/nm) |
|----------------------|--------|----------------------|--------|----------------------|--------|
| 375 | 0.003 | 515 | 0.139 | 655 | 0.079 |
| 380 | 0.003 | 520 | 0.154 | 660 | 0.070 |
| 385 | 0.003 | 525 | 0.166 | 665 | 0.062 |
| 390 | 0.003 | 530 | 0.175 | 670 | 0.055 |
| 395 | 0.003 | 535 | 0.181 | 675 | 0.048 |
| 400 | 0.003 | 540 | 0.186 | 680 | 0.042 |
| 405 | 0.004 | 545 | 0.190 | 685 | 0.037 |
| 410 | 0.005 | 550 | 0.194 | 690 | 0.032 |
| 415 | 0.008 | 555 | 0.197 | 695 | 0.028 |
| 420 | 0.013 | 560 | 0.201 | 700 | 0.024 |
| 425 | 0.021 | 565 | 0.203 | 705 | 0.021 |
| 430 | 0.037 | 570 | 0.205 | 710 | 0.018 |
| 435 | 0.064 | 575 | 0.207 | 715 | 0.016 |
| 440 | 0.105 | 580 | 0.207 | 720 | 0.014 |
| 445 | 0.169 | 585 | 0.206 | 725 | 0.012 |
| 450 | 0.266 | 590 | 0.203 | 730 | 0.010 |
| 455 | 0.336 | 595 | 0.198 | 735 | 0.009 |
| 460 | 0.288 | 600 | 0.193 | 740 | 0.008 |
| 465 | 0.193 | 605 | 0.186 | 745 | 0.007 |
| 470 | 0.138 | 610 | 0.176 | 750 | 0.006 |
| 475 | 0.102 | 615 | 0.166 | 755 | 0.005 |
| 480 | 0.074 | 620 | 0.156 | 760 | 0.005 |
| 485 | 0.061 | 625 | 0.144 | 765 | 0.004 |
| 490 | 0.061 | 630 | 0.133 | 770 | 0.003 |
| 495 | 0.068 | 635 | 0.121 | 775 | 0.003 |
| 500 | 0.081 | 640 | 0.110 | 780 | 0.003 |
| 505 | 0.1 | 645 | 0.099 | | |
| 510 | 0.12 | 650 | 0.089 | | |

Test Results: Goniometer

Results include unit flux, distribution, efficacy, and electrical power for sample number L14173.
Dialight unit model number HELRC4GN-xxx

Electrical Measurements:

Input Voltage: 120 (VAC)
Input current: 0.9391 (A)
Input Power: 112.2 (W)
Power Factor: 0.9925

Photometric measurements:

Absolute Luminous Flux: 12509.2 (lumens)
Luminous Efficacy: 111.5 (lumens/W)

Intensity Summary:

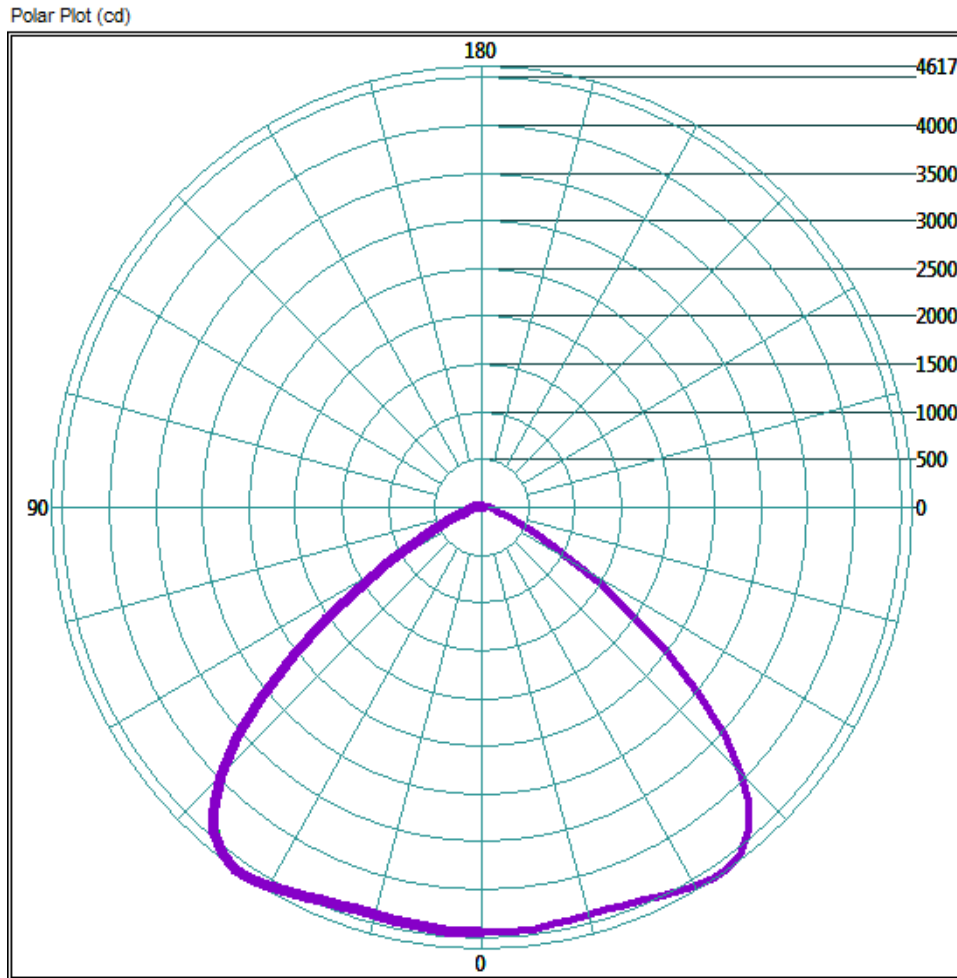
| <u>INTENSITY (CANDLEPOWER) SUMMARY</u> | | | | | | |
|--|-------|------|------|------|--------|---------------|
| ANGLE | ALONG | 22.5 | 45 | 67.5 | ACROSS | OUTPUT LUMENS |
| 0 | 4457 | 4457 | 4457 | 4457 | 4457 | |
| 5 | 4449 | 4447 | 4448 | 4450 | 4450 | 166 |
| 15 | 4412 | 4410 | 4411 | 4413 | 4415 | 945 |
| 25 | 4486 | 4484 | 4487 | 4488 | 4493 | 1766 |
| 35 | 4617 | 4606 | 4609 | 4602 | 4613 | 2603 |
| 45 | 3963 | 3927 | 3932 | 3921 | 3931 | 3091 |
| 55 | 2040 | 2005 | 2004 | 2009 | 2021 | 2355 |
| 65 | 614 | 603 | 596 | 604 | 614 | 982 |
| 75 | 198 | 197 | 193 | 197 | 202 | 314 |
| 85 | 105 | 105 | 104 | 106 | 108 | 139 |
| 95 | 73 | 72 | 74 | 77 | 77 | 95 |
| 105 | 26 | 23 | 25 | 28 | 27 | 47 |
| 115 | 0 | 0 | 0 | 0 | 0 | 6 |
| 125 | 0 | 0 | 0 | 0 | 0 | 0 |
| 135 | 0 | 0 | 0 | 0 | 0 | 0 |
| 145 | 0 | 0 | 0 | 0 | 0 | 0 |
| 155 | 0 | 0 | 0 | 0 | 0 | 0 |
| 165 | 0 | 0 | 0 | 0 | 0 | 0 |
| 175 | 0 | 0 | 0 | 0 | 0 | 0 |
| 180 | 0 | 0 | 0 | 0 | 0 | 0 |

| <u>ZONAL LUMEN AND PERCENTAGES</u> | | |
|------------------------------------|----------|-------------|
| ZONE | LUMENS | % LUMINAIRE |
| 0-30 | 4076.7 | 32.6% |
| 0-40 | 7023.66 | 56.1% |
| 0-60 | 11554.04 | 92.4% |
| 60-90 | 1130.6 | 9.0% |
| 0-90 | 12412.62 | 99.2% |
| 90-180 | 121.68 | 1.0% |
| 0-180 | 12509.08 | 100.0% |

Test Results: Goniometer

Results continued from previous page.

Polar Plot:

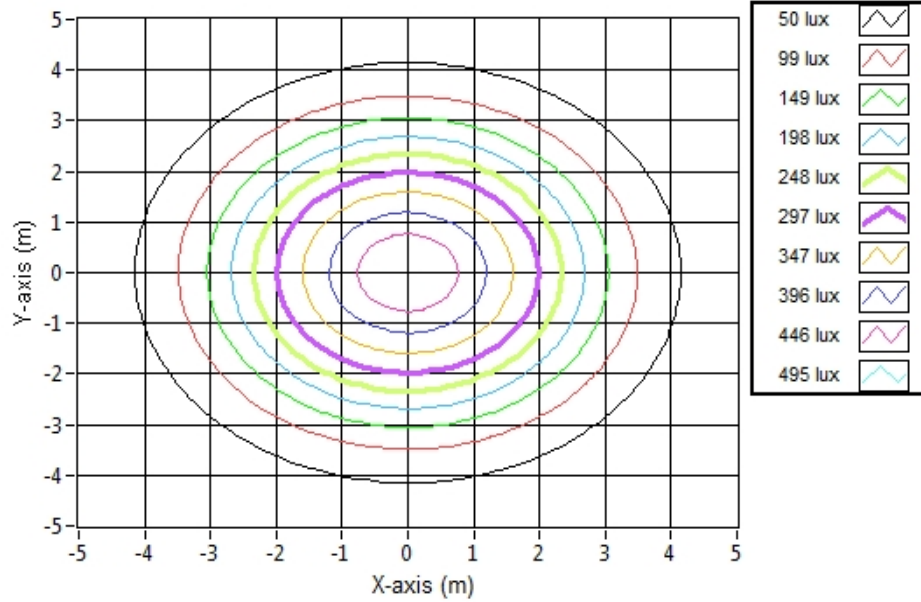


Test Results: Goniometer

Results continued from previous page.

Illuminance Plots:

Illuminance Contour Graph



Illuminance-Cone of Light:

| Mounting Height (m) | Beam Cone Width (m) | Orthogonal Beam Cone Width (m) | Projected Illuminance (lux) |
|---------------------|---------------------|--------------------------------|-----------------------------|
| 3.048 | 8.42 | 8.39 | 479.7 |
| 6.096 | 16.84 | 16.77 | 119.9 |
| 9.144 | 25.26 | 25.16 | 53.3 |
| 12.192 | 33.68 | 33.55 | 30.0 |
| 15.24 | 42.10 | 41.93 | 19.2 |
| 18.288 | 50.52 | 50.32 | 13.3 |
| 21.336 | 58.94 | 58.71 | 9.8 |
| 24.384 | 67.36 | 67.09 | 7.5 |
| 27.432 | 75.78 | 75.48 | 5.9 |
| 30.48 | 84.19 | 83.87 | 4.8 |

Test Results: In Situ Temperature Measurement Test

Results include maximum LED chip temperature for sample number L14173.
Dialight unit model number HELRC4GN-xxx

LED identified as Nichia part number NT2W757DT .

LED drive current (as indicated by customer): 100 (mA)

LED Specifications:

LED specifications are taken from LED manufacturer datasheet:

Maximum Forward Current (If): 300 (mA)
Maximum Rated Power Dissipation: 1.05 (W)
Maximum Junction Temp. (Tj): 120 (°C)
Thermal Resistance (Rth): 18 (°C/W)

Derived Specifications:

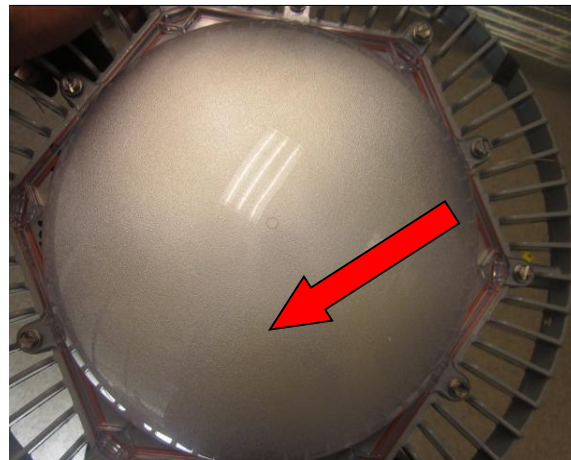
Maximum Power at Indicated Current: 0.35 (W)
Maximum Source Temperature: 113.7 (°C)

Test Conditions:

Temperature Measurement Location: See Photographs Below
Ambient Temperature: $25^{\circ} \pm 1^{\circ}$ (°C)
Ambient temperature at time of measurement: 25.3 (°C)
Relative humidity at time of measurement: 10%

Results:

Measured LED source temperature: 50.9 (°C)



Equipment Used:

| Equipment Name | Model Number | Calibration Due Date |
|---|------------------|----------------------|
| Omega TC | Dpi8 | 3/7/2015 |
| Fluke 8808A Digit Multimeter | 8808A | 4/7/2015 |
| YOKOGAWA Digital Power Meter | 760401 | 4/7/2015 |
| LSI Standard Lamps | #30279 | 4/17/2015 |
| LSI High Speed Mirror Goniometer | 6240T | - |
| Instrument System Spectrometer | CAS140B-151 | - |
| Instrument System Sphere Lamps (Osram Sylvania) | STD-20WF-3 | 4/17/2015 |
| Instrument System Sphere Lamps (Osram Sylvania) | STD-20WF-3 | 4/17/2015 |
| Instrument System Sphere Lamps (Osram Sylvania) | STD-20WF-3 | 4/17/2015 |
| Instrument System 1.5 Meter Sphere | ISP1500 | - |
| Volttech Power Analyzer | PM1000+ | 4/17/2015 |
| Delta Elektronika DC Power Supply | SM.300-5 | - |
| Elgar AC Power Supply | CW1251P | - |
| Instek AC Power Supply | APS-9501 | - |
| Sorensen DC Power Supply | XHR150-7 | - |
| Extech Hygro-Thermometer | 445703 | - |
| Extech Hygro-Thermometer | 445703 | - |
| Fluke 52II Thermometer | 52II Thermometer | 3/6/2015 |
| Volttech Power Analyzer | PM1000+ | 4/17/2015 |
| Tenma AC Power Source | 72-7675 | - |
| BK Precision | 1715A | - |
| TDK-Lambda | GEN1500W | - |
| Fluke 8808A Digit Multimeter | 8808A | 4/14/2015 |
| TPI Digital Thermometer 343 | 343 | 4/17/2015 |
| TPI Digital Thermometer 343 | 343 | 4/17/2015 |

Additional Notes:

Samples are received and tested in new and undamaged condition, unless otherwise noted.

The results shown in this report are representative only of the test samples submitted. This data has been issued to the assignee for further evaluation.

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