UL Verification Services Inc.
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ACCREDITED

NVLAP LAB CODE 201042-0

# Indoor Distribution Test Report

Relevant Standards
IES LM-79-2008
ANSI C82.77-2002

**Prepared For**

## LED Waves, LLC

Tiago Zeitoune
The Esquire Buikding at 41st ST
4100 1st Avenue 3rd Fl North
Brooklyn, NY 11232

**Catalog Number**

**PR15-8-V1-W3000K-N**

Order Number
10974084
Test Number
1163211

Test Date

2015-09-29

Prepared By

Kevin Rodriguez, Technician

Approved By

Kyle Spaziani, Project Handler

**Luminaire Description:** White steel / aluminum housing, frosted plastic lens enclosure
**Lamp:** 100 white LEDs
**Mounting:** Recessed
**Ballast/Driver:** LD024D-CA10024-15

**Luminaire**

**Luminaire Characteristics**
Luminous Diameter: 7.50 in.

**Summary of Results**

| | |
|---|---|
| Total Luminaire Output: | 1305 Lumens |
| Luminaire Efficacy: | 76.7 lm/w |
| Maximum Candela: | 468 Candela |

**Electrical Data**

| | | |
|---|---|---|
| Test Temperature: | 24.6 | °C |
| Voltage: | 120.0 | VAC |
| Current: | 0.1555 | A |
| Power: | 17.02 | W |
| Power Factor: | 0.912 | |
| Frequency: | 60 | Hz |
| Current THD: | 32.0 | % |

Laboratory results may not be representative of field performance
Ballast factors have not been applied

## Distribution - Goniophotometer

Distribution Test Conditions

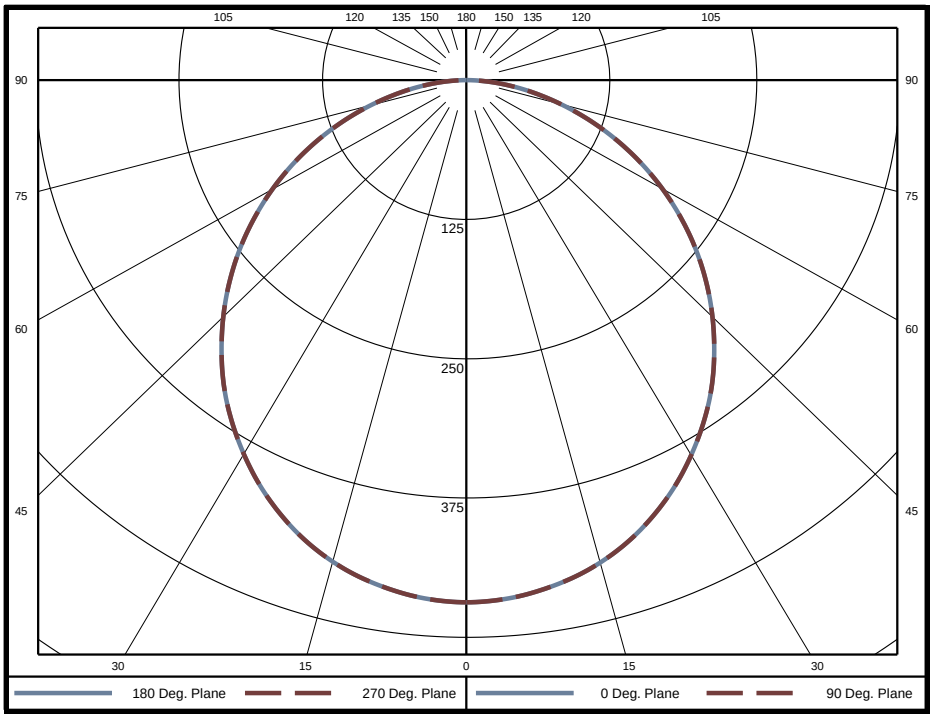
| Temperature | Voltage | Current | Power | Power Factor | Frequency | Current THD |
|---|---|---|---|---|---|---|
| 24.6 °C | 120.0 VAC | 0.1555 A | 17.02 W | 0.912 | 60 Hz | 32.0 % |

### Summary of Results

**Spacing Criteria**
0-180: 1.24
90-270: 1.24

**Total Lumen Output:** 1305 Lumens
**Luminaire Efficacy:** 76.7 lm/w
**Maximum Candela:** 468 Candela

### Polar Plot




### Zonal Lumen Summary

| Zone | Lumens | % of Luminaire | Zone | Lumens | % of Luminaire | Zone | Lumens | % of Luminaire |
|---|---|---|---|---|---|---|---|---|
| 0-5 | 11.2 | 0.9% | 60-65 | 86.6 | 6.6% | 120-125 | 0 | 0.0% |
| 5-10 | 33.1 | 2.5% | 65-70 | 71.4 | 5.5% | 125-130 | 0 | 0.0% |
| 10-15 | 53.8 | 4.1% | 70-75 | 54.5 | 4.2% | 130-135 | 0 | 0.0% |
| 15-20 | 72.6 | 5.6% | 75-80 | 37.1 | 2.8% | 135-140 | 0 | 0.0% |
| 20-25 | 88.6 | 6.8% | 80-85 | 20.7 | 1.6% | 140-145 | 0 | 0.0% |
| 25-30 | 101.5 | 7.8% | 85-90 | 6.0 | 0.5% | 145-150 | 0 | 0.0% |
| 30-35 | 110.7 | 8.5% | 90-95 | 0 | 0.0% | 150-155 | 0 | 0.0% |
| 35-40 | 116.2 | 8.9% | 95-100 | 0 | 0.0% | 155-160 | 0 | 0.0% |
| 40-45 | 117.5 | 9.0% | 100-105 | 0 | 0.0% | 160-165 | 0 | 0.0% |
| 45-50 | 115.1 | 8.8% | 105-110 | 0 | 0.0% | 165-170 | 0 | 0.0% |
| 50-55 | 109.0 | 8.4% | 110-115 | 0 | 0.0% | 170-175 | 0 | 0.0% |
| 55-60 | 99.3 | 7.6% | 115-120 | 0 | 0.0% | 175-180 | 0 | 0.0% |

| Zone | Lumens | % of Luminaire |
|---|---|---|
| 0-40 | 588 | 45.0% |
| 0-60 | 1029 | 78.8% |
| 0-90 | 1305 | 100.0% |
| 90-180 | 0 | 0.0% |

## Candela Tabulation

Horizontal Angle (Degrees)

| Vertical Angle (Degrees) | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 | 202.5 | 225 | 247.5 | 270 | 292.5 | 315 | 337.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 | 468.5 |
| 5 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 | 465.9 |
| 10 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 | 459.0 |
| 15 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 | 448.1 |
| 20 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 | 432.6 |
| 25 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 | 412.7 |
| 30 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 | 389.1 |
| 35 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 | 362.9 |
| 40 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 | 333.4 |
| 45 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 | 301.6 |
| 50 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 | 268.2 |
| 55 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 | 233.2 |
| 60 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 | 196.8 |
| 65 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 | 159.7 |
| 70 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 | 122.5 |
| 75 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 | 86.3 |
| 80 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 | 53.3 |
| 85 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 |
| 90 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| 95 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

## Average Luminance (cd/m$^2$)

Horizontal Angle (Degrees)

| Vertical Angle (Degrees) | 0 | 45 | 90 |
|---|---|---|---|
| 0 | 16440 | 16440 | 16440 |
| 45 | 14960 | 14960 | 14960 |
| 55 | 14260 | 14260 | 14260 |
| 65 | 13260 | 13260 | 13260 |
| 75 | 11700 | 11700 | 11700 |
| 85 | 9549 | 9549 | 9549 |

## Utilization of Lumens - Zonal Cavity Method

| Effective Floor Cavity Reflectance 20% | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ceiling Cavity Reflectance | 80 | | | | 70 | | | | 50 | | | 30 | | | 10 | | | 0 |
| Wall Reflectance | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| Room Cavity Ratio (RCR) | ** Values are expressed as Lumens delivered to the task surface ** | | | | | | | | | | | | | | | | | |
| 0 | 1554 | 1554 | 1554 | 1554 | 1517 | 1517 | 1517 | 1517 | 1450 | 1450 | 1450 | 1388 | 1388 | 1388 | 1332 | 1332 | 1332 | 1305 |
| 1 | 1418 | 1355 | 1299 | 1248 | 1382 | 1325 | 1274 | 1227 | 1270 | 1227 | 1189 | 1219 | 1184 | 1152 | 1172 | 1144 | 1118 | 1090 |
| 2 | 1289 | 1181 | 1091 | 1015 | 1255 | 1156 | 1073 | 1003 | 1109 | 1040 | 980 | 1067 | 1008 | 957 | 1027 | 979 | 936 | 907 |
| 3 | 1175 | 1036 | 929 | 844 | 1142 | 1016 | 916 | 836 | 977 | 891 | 821 | 941 | 868 | 807 | 907 | 846 | 793 | 764 |
| 4 | 1076 | 918 | 803 | 715 | 1045 | 901 | 793 | 710 | 868 | 774 | 700 | 837 | 756 | 690 | 809 | 739 | 681 | 652 |
| 5 | 989 | 821 | 703 | 616 | 962 | 806 | 695 | 612 | 778 | 680 | 605 | 752 | 666 | 599 | 728 | 653 | 592 | 564 |
| 6 | 914 | 739 | 622 | 538 | 888 | 726 | 616 | 535 | 703 | 604 | 530 | 681 | 593 | 525 | 660 | 582 | 521 | 494 |
| 7 | 847 | 670 | 555 | 475 | 824 | 659 | 550 | 473 | 639 | 541 | 470 | 620 | 532 | 466 | 603 | 523 | 463 | 436 |
| 8 | 789 | 612 | 500 | 424 | 768 | 603 | 496 | 422 | 585 | 489 | 420 | 569 | 481 | 417 | 553 | 474 | 414 | 389 |
| 9 | 737 | 561 | 454 | 381 | 718 | 554 | 451 | 380 | 539 | 444 | 378 | 524 | 438 | 376 | 511 | 432 | 374 | 350 |
| 10 | 691 | 518 | 415 | 346 | 674 | 511 | 412 | 345 | 498 | 407 | 343 | 486 | 402 | 342 | 474 | 397 | 340 | 317 |

## Cone of Light Tabulation

| Mounting Height | Footcandles at Nadir | Diameter (Feet) |
|---|---|---|
| 4.00 | 29.3 | 4.94 |
| 6.00 | 13.0 | 7.41 |
| 8.00 | 7.32 | 9.88 |
| 10.0 | 4.68 | 12.4 |
| 12.0 | 3.25 | 14.8 |
| 14.0 | 2.39 | 17.3 |
| 16.0 | 1.83 | 19.8 |

## Cone of Light Plot