

VISUAL COMFORT & CO.

TEST REPORT

SCOPE OF WORK

Electrical and Photometric tests as required to the IESNA LM-79 test standard.

MODEL NUMBER

ENCL3RFD-927W - 12W - 40deg

REPORT NUMBER

104206403CHI-099

ISSUE DATE

May 18, 2020

REVISION DATE

July 21, 2020

DOCUMENT CONTROL NUMBER

TBD

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REPORT NO.: 104206403CHI-099

TEST REPORT

REPORT DATE: July 21, 2020

TEST OF ONE ENCL3 RD FL FIX 927 W - 90CRI 2700K 40 DEGREE 300 MA

MODEL NO. ENCL3RFD-927W - 12W - 40DEG
LED MODEL NO. LUMINUS CXM-9-27-90-36-AC40-F5-3
DRIVER MODEL NO. ERP ESS015W-0300-42

RENDERED TO:

VISUAL COMFORT & CO.
7400 LINDER AVE.
SKOKIE IL 60077

STATEMENT OF LIMITATIONS

NVLAP Lab Code 600186-0. 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 Qu-01040682-1.

STANDARDS USED

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting
ANSI NEMA ANSLG C78.377: 2015: Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE

The client submitted one production sample of model number ENCL3RFD-927W - 12W - 40deg. The sample was received by Intertek on May 8, 2020 in undamaged condition and one sample was tested as received. The sample designation was AH05082020115126.

DATE OF TESTS

May 12, 2020 through May 13, 2020.

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SUMMARY

| | |
|---------------------|--|
| MODEL NO: | ENCL3RFD-927W - 12W - 40deg |
| DESCRIPTION: | ENCL3 RD FL FIX 927 W - 90CRI 2700K 40 Degree 300 mA |

| CRITERIA | RESULTS | |
|------------------------------------|--------------------|-----------------|
| | INTEGRATING SPHERE | GONIOPHOTOMETER |
| Lumen Output (lumens) | 1025.2 | 1030.5 |
| Input Power (W) @ 120 (VAC) | 11.64 | 11.65 |
| Lumen Efficacy (lm/W) | 88.1 | 88.5 |
| Input Power Factor () @ 120 (VAC) | 0.984 | 0.986 |

| CRITERIA | RESULTS |
|------------------------------------|---------|
| Input Current ATHD (%) @ 120 (VAC) | 14.88 |
| Correlated Color Temperature (K) | 2758 |
| Color Rendering Index - Ra | 93.7 |
| Color Rendering - R9 | 66.1 |
| DUV | 0.0005 |
| Chromaticity Coordinate (x) | 0.456 |
| Chromaticity Coordinate (y) | 0.411 |
| Chromaticity Coordinate (u') | 0.260 |
| Chromaticity Coordinate (v') | 0.527 |

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EQUIPMENT LIST

| EQUIPMENT USED | MODEL NO. | CONTROL NO. | LAST CAL DATE | CAL DUE DATE |
|----------------------------------|-----------|-------------|---------------|--------------|
| Yokogawa Power Meter | WT210 | 146919 | 7/1/2019 | 7/1/2020 |
| Omega Thermometer | DPI8-C24 | 146920 | 10/3/2019 | 10/3/2020 |
| LSI High Speed Mirror Goniometer | 6440T | 146928 | VBV | VBV |
| Newport Thermohygrometer | iServer | 146957 | 12/2/2019 | 12/2/2020 |
| Pacific, AC Power Supply | 118-ACX | CHI0153 | VBV | VBV |
| Labsphere Spectroradiometer | CDS-600 | 146923 | VBV | VBV |
| 2M Rotating Sphere | 7660-ROT | 146923 | VBV | VBV |
| Omega thermometer | USB TC08 | EQA00-26615 | 4/7/2020 | 4/7/2021 |
| Ametek DC Power Supply | XFR150-8 | 146846 | VBV | VBV |
| Newport Humidity Recorder | iTHX-SD | 146961 | 7/26/2019 | 7/26/2020 |
| Yokogawa Power Meter | WT210 | 146880 | 10/2/2019 | 10/2/2020 |
| Chroma Power Supply | 61604 | CHI0371 | VBV | VBV |
| Yokogawa Power Meter | WT1600 | 146770 | 10/1/2019 | 10/1/2020 |
| Pacific AC Power Supply | ACX-118 | CHI0154 | VBV | VBV |

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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 Spectroradiometer and integrating 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. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a 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 Type C Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for the SSL sample.

Ambient temperature was measured equal to the height of the sample mounted on the goniometer equipment. The SSL sample was operated on the client provided driver at rated input volts in its designated orientation. The SSL sample was allowed to stabilize for at least thirty minutes before measurements were made. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a power analyzer.

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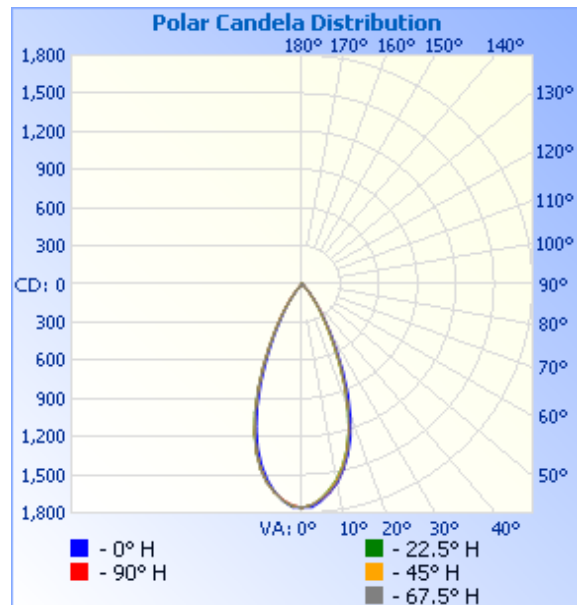
RESULTS OF TESTS

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - DISTRIBUTION METHOD (25°C +/- 1°C)

| INTERTEK CONTROL NO. | BASE POSITION | INPUT VOLTAGE (VAC) | INPUT CURRENT (mA) | INPUT POWER (W) | INPUT POWER FACTOR | LIGHT OUTPUT (lm) | LUMEN EFFICACY (lm/W) |
|----------------------|---------------|---------------------|--------------------|-----------------|--------------------|-------------------|-----------------------|
| AH05082020115126 | Base Up | 120.1 | 98.4 | 11.65 | 0.986 | 1030.5 | 88.5 |

INTENSITY SUMMARY - CANDELAS

| Angle | 0 | 22.5 | 45 | 67.5 | 90 |
|-------|------|------|------|------|------|
| 0 | 1757 | 1757 | 1757 | 1757 | 1757 |
| 5 | 1715 | 1692 | 1693 | 1698 | 1704 |
| 10 | 1587 | 1556 | 1561 | 1576 | 1582 |
| 15 | 1386 | 1345 | 1353 | 1366 | 1366 |
| 20 | 1105 | 1042 | 1049 | 1056 | 1057 |
| 25 | 759 | 686 | 698 | 711 | 719 |
| 30 | 441 | 391 | 400 | 415 | 419 |
| 35 | 228 | 203 | 211 | 221 | 229 |
| 40 | 96 | 82 | 84 | 90 | 93 |
| 45 | 34 | 29 | 29 | 31 | 31 |
| 50 | 10 | 9 | 9 | 10 | 10 |
| 55 | 5 | 5 | 5 | 5 | 5 |
| 60 | 3 | 3 | 3 | 3 | 3 |
| 65 | 2 | 2 | 2 | 2 | 2 |
| 70 | 2 | 2 | 2 | 2 | 2 |
| 75 | 1 | 1 | 1 | 1 | 1 |
| 80 | 1 | 1 | 1 | 1 | 1 |
| 85 | 0 | 0 | 0 | 0 | 0 |
| 90 | 0 | 0 | 0 | 0 | 0 |



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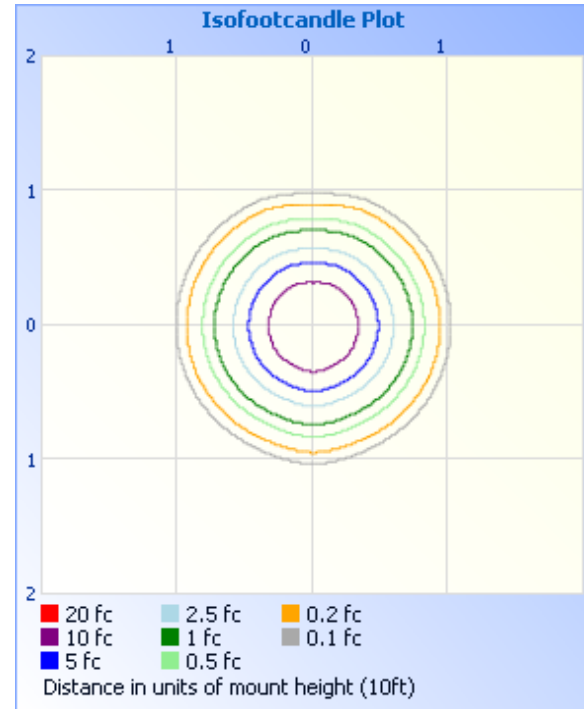
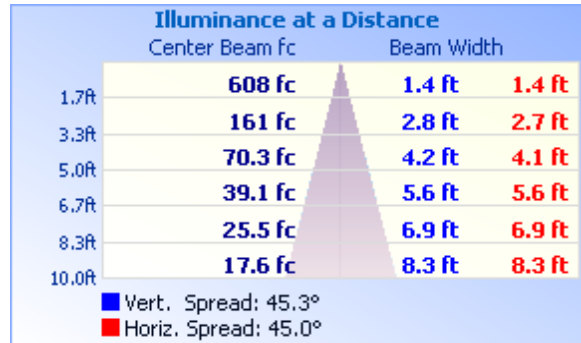
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RESULTS OF TESTS

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - DISTRIBUTION METHOD (25°C +/- 1°C)

| MOUNTING HEIGHT: 10ft | |
|-----------------------------|----------------------|
| ILLUMINANCE - CONE OF LIGHT | ISOILLUMINATION PLOT |



ZONAL LUMEN SUMMARY AND PERCENTAGES

| ZONE | LUMENS | % LUMINAIRE |
|--------|--------|-------------|
| 0-30 | 855.0 | 83.0 |
| 0-40 | 993.6 | 96.4 |
| 0-60 | 1026.5 | 99.6 |
| 60-90 | 4.0 | 0.4 |
| 70-100 | 1.7 | 0.2 |
| 90-120 | 0.0 | 0.0 |
| 0-90 | 1030.5 | 100.0 |
| 90-180 | 0.0 | 0.0 |
| 0-180 | 1030.5 | 100.0 |

| ZONE | LUMENS | % LUMINAIRE |
|-------|--------|-------------|
| 0-10 | 158.2 | 15.4 |
| 10-20 | 373.5 | 36.2 |
| 20-30 | 323.3 | 31.4 |
| 30-40 | 138.6 | 13.5 |
| 40-50 | 28.1 | 2.7 |
| 50-60 | 4.8 | 0.5 |
| 60-70 | 2.3 | 0.2 |
| 70-80 | 1.2 | 0.1 |
| 80-90 | 0.4 | 0.0 |

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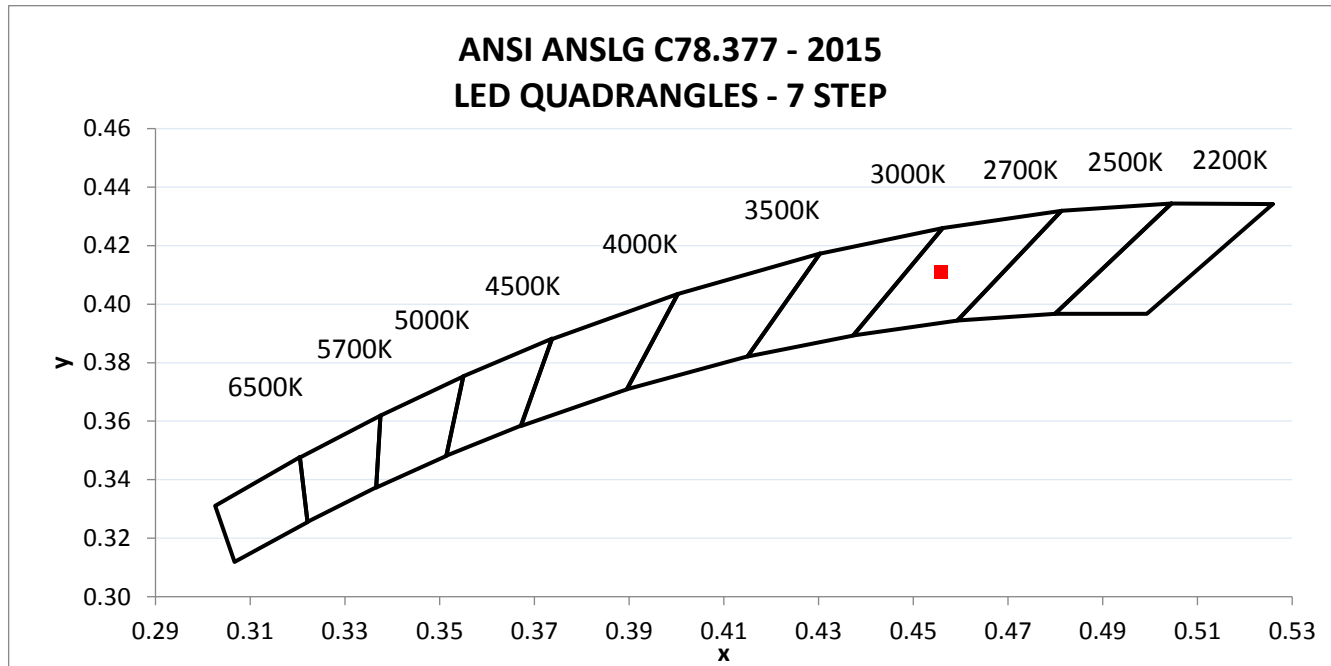
RESULTS OF TESTS

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - INTEGRATING SPHERE METHOD (25°C +/- 1°C)

| INTERTEK CONTROL NO. | BASE POSITION | INPUT VOLTAGE (VAC) | INPUT CURRENT (mA) | INPUT POWER (W) | INPUT POWER FACTOR () | INPUT CURRENT ATHD (%) |
|----------------------|---------------|---------------------|--------------------|-----------------|------------------------|------------------------|
| AH05082020115126 | Base Up | 119.99 | 98.57 | 11.64 | 0.984 | 14.88 |

| LIGHT OUTPUT (lm) | LUMEN EFFICACY (lm/W) | CORRELATED COLOR TEMPERATURE - CCT (K) | CRI - Ra | CRI - R9 | DUV |
|-------------------|-----------------------|--|----------|----------|--------|
| 1025.2 | 88.1 | 2758 | 93.7 | 66.1 | 0.0005 |

| CIE 1931 CHROMATICITY COORDINATE (x) | CIE 1931 CHROMATICITY COORDINATE (y) | CIE 1976 CHROMATICITY COORDINATE (u') | CIE 1976 CHROMATICITY COORDINATE (v') |
|--------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|
| 0.456 | 0.411 | 0.260 | 0.527 |



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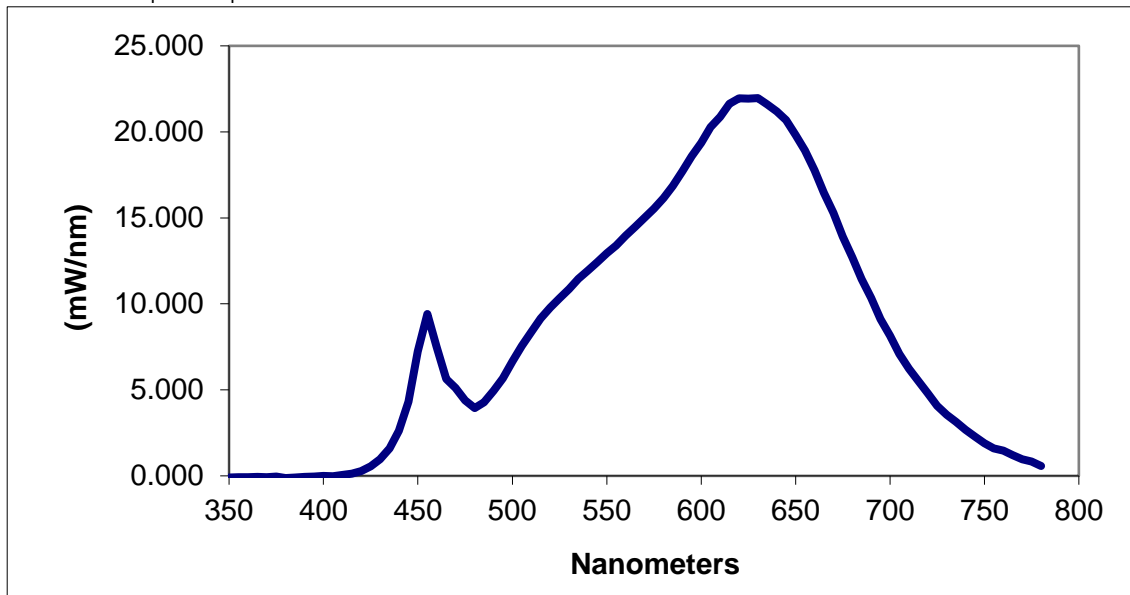
REPORT DATE: July 21, 2020

RESULTS OF TESTS

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS - INTEGRATING SPHERE METHOD (25°C +/- 1°C)

| SPECTRAL DISTRIBUTION OVER VISIBLE WAVELENGTHS* | | | | | | | |
|---|--------|-----|--------|-----|--------|-----|--------|
| nm | mW/nm | nm | mW/nm | nm | mW/nm | nm | mW/nm |
| 350 | -0.097 | 460 | 7.490 | 570 | 15.015 | 680 | 12.702 |
| 355 | -0.077 | 465 | 5.627 | 575 | 15.535 | 685 | 11.447 |
| 360 | -0.076 | 470 | 5.109 | 580 | 16.140 | 690 | 10.333 |
| 365 | -0.059 | 475 | 4.379 | 585 | 16.859 | 695 | 9.105 |
| 370 | -0.079 | 480 | 3.932 | 590 | 17.706 | 700 | 8.144 |
| 375 | -0.046 | 485 | 4.280 | 595 | 18.589 | 705 | 7.080 |
| 380 | -0.127 | 490 | 4.947 | 600 | 19.356 | 710 | 6.234 |
| 385 | -0.095 | 495 | 5.679 | 605 | 20.275 | 715 | 5.518 |
| 390 | -0.063 | 500 | 6.649 | 610 | 20.875 | 720 | 4.790 |
| 395 | -0.038 | 505 | 7.543 | 615 | 21.625 | 725 | 4.068 |
| 400 | 0.002 | 510 | 8.374 | 620 | 21.947 | 730 | 3.552 |
| 405 | -0.012 | 515 | 9.157 | 625 | 21.940 | 735 | 3.146 |
| 410 | 0.048 | 520 | 9.777 | 630 | 21.962 | 740 | 2.675 |
| 415 | 0.135 | 525 | 10.314 | 635 | 21.605 | 745 | 2.282 |
| 420 | 0.284 | 530 | 10.867 | 640 | 21.183 | 750 | 1.904 |
| 425 | 0.548 | 535 | 11.460 | 645 | 20.678 | 755 | 1.598 |
| 430 | 0.970 | 540 | 11.944 | 650 | 19.808 | 760 | 1.472 |
| 435 | 1.598 | 545 | 12.426 | 655 | 18.913 | 765 | 1.209 |
| 440 | 2.625 | 550 | 12.951 | 660 | 17.767 | 770 | 0.964 |
| 445 | 4.317 | 555 | 13.398 | 665 | 16.461 | 775 | 0.840 |
| 450 | 7.231 | 560 | 13.978 | 670 | 15.286 | 780 | 0.583 |
| 455 | 9.416 | 565 | 14.473 | 675 | 13.916 | | |

*Without correction of sample absorption.



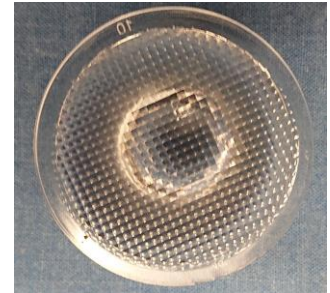
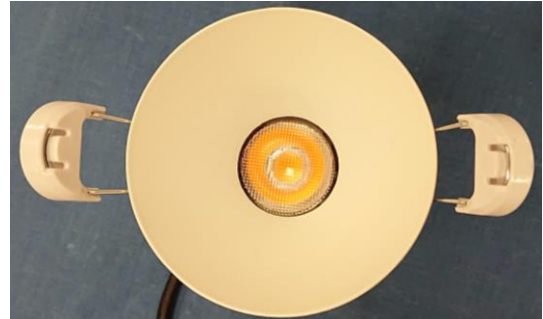
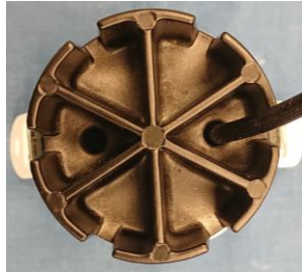
End Of Test Results

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PICTURES



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:

Report Reviewed By:

Signature on file

Signature on file

Ian Smith
Engineer
Lighting Division

Jeff Davis
N.A. Technical Lead
Lighting Division

Attachments: IES File

REVISION HISTORY

| JOB NUMBER | DATE OF REVISION | PROJECT HANDLER | REVIEWED BY | REVISION NOTE |
|------------|------------------|-----------------|-------------|--|
| None | 25-Jun-20 | IS IS | TQ | Model Number, Description, and LED Model Updated |
| None | 21-Jul-20 | IS IS | JD | "B" Removed from Model Number & Description |