

PURE EDGE LIGHTING

TEST REPORT

SCOPE OF WORK

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

MODEL NUMBER

ZSD-2W-4S-36-30K-SN

REPORT NUMBER

102602453CHI-018

ISSUE DATE

June 4, 2018

REVISION DATE

None

DOCUMENT CONTROL NUMBER

TBD

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TEST REPORT

TEST OF ONE LINEAR LED FIXTURE

MODEL NO. ZSD-2W-4S-36-30K-SN
LED MODEL NO. LUMILED/SS2CL-12MM-24VDC-C-30K
DRIVER MODEL NO. MEANWELL APV-16-24

RENDERED TO:

PURE EDGE LIGHTING
1718 WEST FULLERTON
CHICAGO, IL 60614

AUTHORIZATION

The testing performed was authorized by signed quote number Qu-00685500-1.

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 ZSD-2W-4S-36-30K-SN. The sample was received by Intertek on May 17, 2018 in undamaged condition and one sample was tested as received. The sample designation was AH05172018024639-018.

DATE OF TESTS

May 22, 2018 through May 24, 2018.

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SUMMARY

| | |
|---------------------|---------------------|
| MODEL NO: | ZSD-2W-4S-36-30K-SN |
| DESCRIPTION: | Linear LED fixture |

| CRITERIA | RESULTS | |
|------------------------------------|--------------------|-----------------|
| | INTEGRATING SPHERE | GONIOPHOTOMETER |
| Lumen Output (lumens) | 479.1 | 474.4 |
| Input Power (W) @ 120 (VAC) | 9.15 | 9.166 |
| Lumen Efficacy (lm/W) | 52.4 | 51.8 |
| Input Power Factor () @ 120 (VAC) | 0.481 | 0.465 |

| CRITERIA | RESULTS |
|------------------------------------|---------|
| Input Current ATHD (%) @ 120 (VAC) | 86.77 |
| Correlated Color Temperature (K) | 2930 |
| Color Rendering Index - Ra () | 97.3 |
| Color Rendering - R9 () | 90.2 |
| DUV () | 0.0037 |
| Chromaticity Coordinate (x) | 0.437 |
| Chromaticity Coordinate (y) | 0.396 |
| Chromaticity Coordinate (u') | 0.254 |
| Chromaticity Coordinate (v') | 0.518 |

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EQUIPMENT LIST

| EQUIPMENT USED | MODEL NO. | CONTROL NO. | LAST CAL DATE | CAL DUE DATE |
|---|------------------|--------------------|----------------------|---------------------|
| Yokogawa Power Meter | WT210 | 146919 | 7/10/2017 | 7/10/2018 |
| Omega Newport Thermometer | DPI8-C24 | 146920 | 10/4/2017 | 10/4/2018 |
| LSI High Speed Mirror Goniometer | 6440T | 146928 | VBV | VBV |
| Newport Thermohygrometer | iServer | 146957 | 11/17/2017 | 11/17/2018 |
| Pacific, AC power supply | 118-ACX | CHI0358 | VBV | VBV |
| Labsphere 2M Sphere & Spectroradiometer | CDS1100 | 146137 | VBV | VBV |
| Elgar AC Power Supply | CW1251M | 146113 | VBV | VBV |
| Sorenson DC Power Supply | XFR150-8 | 146847 | VBV | VBV |
| Yokogawa Power Analyzer | WT1600 | 146767 | 4/5/2018 | 4/5/2019 |
| Omega Temperature | MDSi8 | 146873 | 7/20/2017 | 7/20/2018 |
| Newport Thermohygrometer | iTHX-M | 146382 | 7/14/2017 | 7/14/2018 |

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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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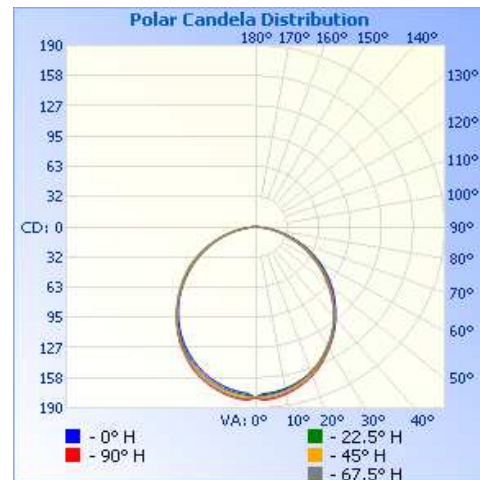
RESULTS OF TESTS

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) |
|----------------------|---------------|---------------------|--------------------|-----------------|------------------------|-------------------|-----------------------|
| AH05172018024639-018 | Base Up | 120.1 | 164.2 | 9.166 | 0.465 | 474.4 | 51.8 |

INTENSITY SUMMARY - CANDELAS

| Angle | 0 | 22.5 | 45 | 67.5 | 90 |
|-------|-----|------|-----|------|-----|
| 0 | 179 | 179 | 179 | 179 | 179 |
| 5 | 175 | 176 | 178 | 180 | 181 |
| 10 | 172 | 174 | 175 | 176 | 178 |
| 15 | 168 | 169 | 170 | 171 | 173 |
| 20 | 162 | 162 | 163 | 165 | 166 |
| 25 | 155 | 154 | 155 | 156 | 158 |
| 30 | 146 | 145 | 146 | 146 | 147 |
| 35 | 137 | 134 | 135 | 135 | 136 |
| 40 | 125 | 123 | 123 | 123 | 123 |
| 45 | 113 | 111 | 110 | 110 | 110 |
| 50 | 101 | 98 | 97 | 96 | 96 |
| 55 | 87 | 85 | 84 | 82 | 82 |
| 60 | 74 | 72 | 70 | 69 | 68 |
| 65 | 60 | 58 | 56 | 55 | 54 |
| 70 | 46 | 44 | 42 | 41 | 41 |
| 75 | 33 | 30 | 29 | 28 | 28 |
| 80 | 20 | 18 | 17 | 16 | 16 |
| 85 | 9 | 7 | 6 | 6 | 5 |
| 90 | 0 | 0 | 0 | 0 | 0 |



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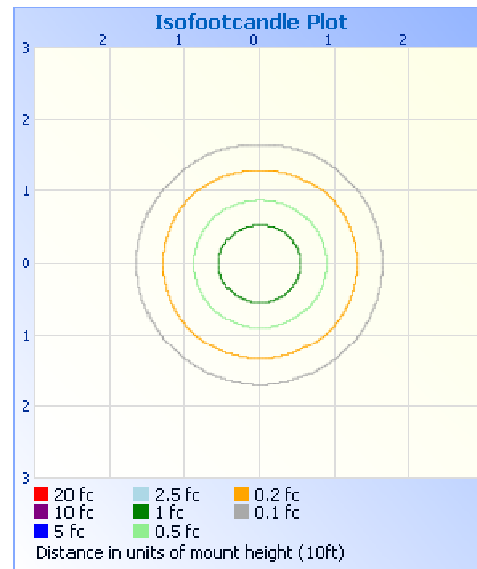
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RESULTS OF TESTS

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 | 136.2 | 28.7 |
| 0-40 | 220.5 | 46.5 |
| 0-60 | 380.4 | 80.2 |
| 60-90 | 93.9 | 19.8 |
| 70-100 | 38.2 | 8.0 |
| 90-120 | 0.0 | 0.0 |
| 0-90 | 474.4 | 100.0 |
| 90-180 | 0.0 | 0.0 |
| 0-180 | 474.4 | 100.0 |

| ZONE | LUMENS | % LUMINAIRE |
|-------|--------|-------------|
| 0-10 | 16.9 | 3.6 |
| 10-20 | 47.9 | 10.1 |
| 20-30 | 71.5 | 15.1 |
| 30-40 | 84.3 | 17.8 |
| 40-50 | 85.0 | 17.9 |
| 50-60 | 74.9 | 15.8 |
| 60-70 | 55.8 | 11.8 |
| 70-80 | 31.1 | 6.6 |
| 80-90 | 7.1 | 1.5 |

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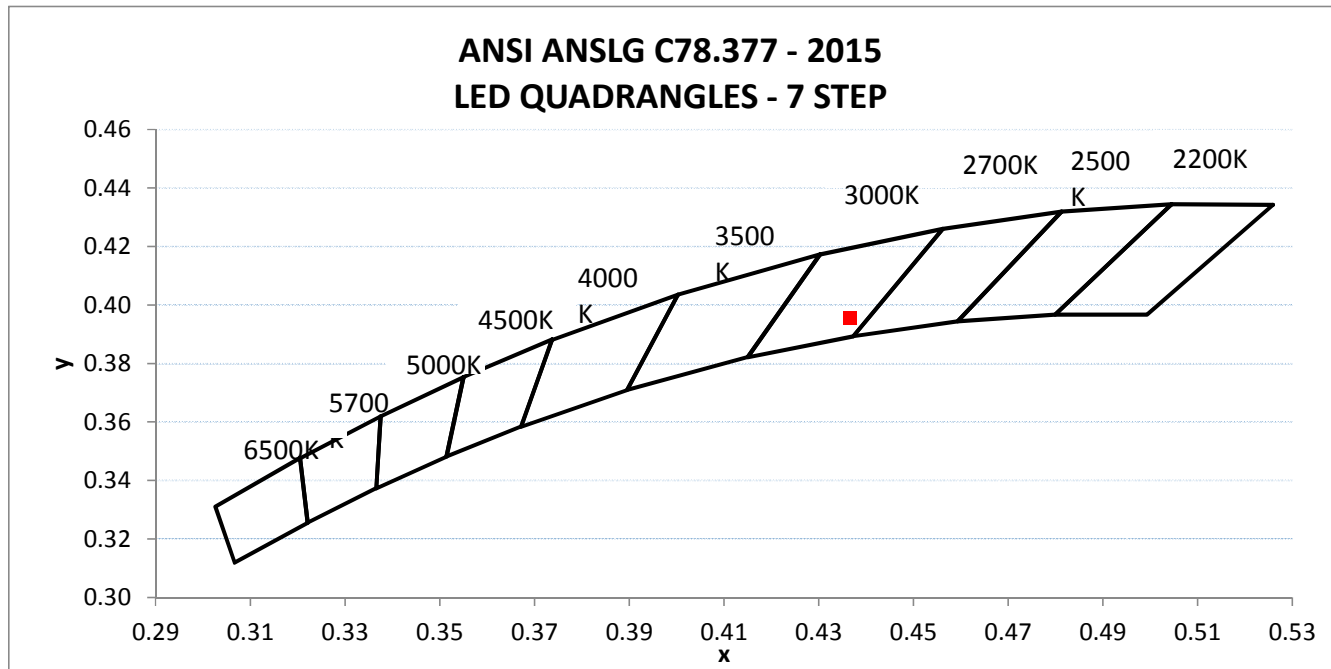
RESULTS OF TESTS

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 (%) |
|----------------------|---------------|---------------------|--------------------|-----------------|------------------------|------------------------|
| AH05172018024639-018 | Base Up | 119.99 | 158.47 | 9.15 | 0.481 | 86.77 |

| LIGHT OUTPUT (lm) | LUMEN EFFICACY (lm/W) | CORRELATED COLOR TEMPERATURE - CCT (K) | CRI - Ra () | CRI - R9 () | DUV () |
|-------------------|-----------------------|--|--------------|--------------|---------|
| 479.1 | 52.4 | 2930 | 97.3 | 90.2 | 0.0037 |

| CIE 1931 CHROMATICITY COORDINATE (x) | CIE 1931 CHROMATICITY COORDINATE (y) | CIE 1976 CHROMATICITY COORDINATE (u') | CIE 1976 CHROMATICITY COORDINATE (v') |
|--------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|
| 0.437 | 0.396 | 0.254 | 0.518 |



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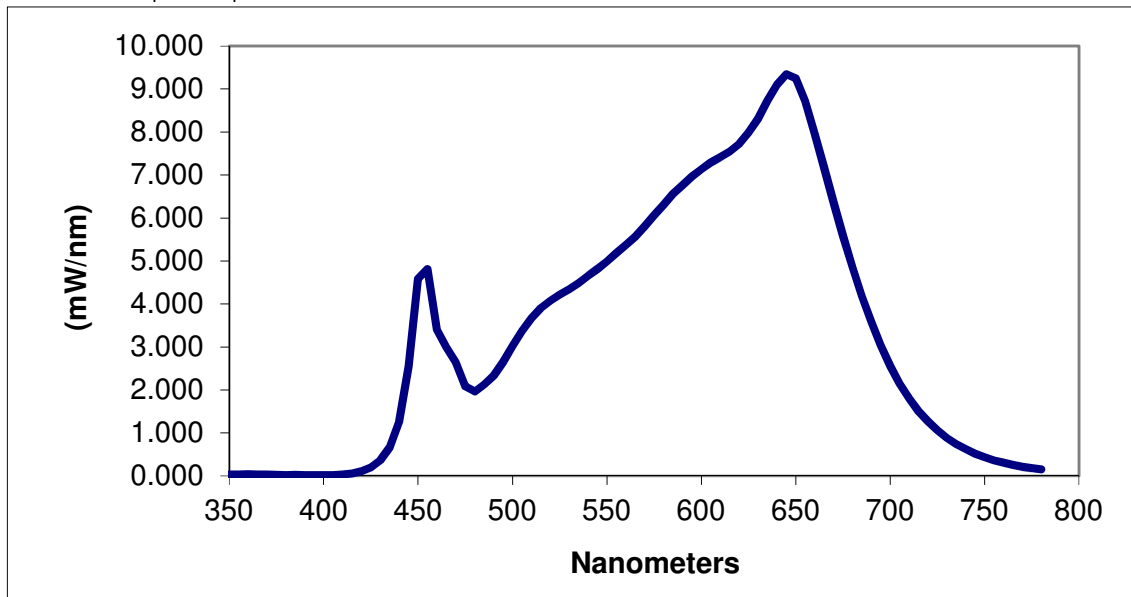
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RESULTS OF TESTS

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 | 0.039 | 460 | 3.417 | 570 | 5.808 | 680 | 4.859 |
| 355 | 0.037 | 465 | 2.995 | 575 | 6.064 | 685 | 4.191 |
| 360 | 0.041 | 470 | 2.648 | 580 | 6.311 | 690 | 3.589 |
| 365 | 0.039 | 475 | 2.080 | 585 | 6.560 | 695 | 3.043 |
| 370 | 0.033 | 480 | 1.961 | 590 | 6.763 | 700 | 2.562 |
| 375 | 0.029 | 485 | 2.128 | 595 | 6.964 | 705 | 2.156 |
| 380 | 0.022 | 490 | 2.339 | 600 | 7.137 | 710 | 1.805 |
| 385 | 0.025 | 495 | 2.649 | 605 | 7.290 | 715 | 1.511 |
| 390 | 0.022 | 500 | 3.031 | 610 | 7.421 | 720 | 1.268 |
| 395 | 0.022 | 505 | 3.370 | 615 | 7.547 | 725 | 1.061 |
| 400 | 0.022 | 510 | 3.665 | 620 | 7.720 | 730 | 0.886 |
| 405 | 0.025 | 515 | 3.909 | 625 | 7.981 | 735 | 0.743 |
| 410 | 0.036 | 520 | 4.074 | 630 | 8.312 | 740 | 0.620 |
| 415 | 0.060 | 525 | 4.220 | 635 | 8.727 | 745 | 0.519 |
| 420 | 0.107 | 530 | 4.343 | 640 | 9.098 | 750 | 0.436 |
| 425 | 0.198 | 535 | 4.489 | 645 | 9.343 | 755 | 0.366 |
| 430 | 0.363 | 540 | 4.658 | 650 | 9.250 | 760 | 0.308 |
| 435 | 0.672 | 545 | 4.816 | 655 | 8.719 | 765 | 0.258 |
| 440 | 1.254 | 550 | 4.996 | 660 | 7.972 | 770 | 0.217 |
| 445 | 2.552 | 555 | 5.182 | 665 | 7.177 | 775 | 0.183 |
| 450 | 4.583 | 560 | 5.372 | 670 | 6.364 | 780 | 0.156 |
| 455 | 4.810 | 565 | 5.565 | 675 | 5.592 | | |

*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:

Tess Gallagher

Tess Gallagher
Engineer
Lighting Division

Report Reviewed By:

Tim Quigley

Timothy Quigley
Engineer
Lighting Division

Attachments: IES File

REVISION HISTORY

| JOB NUMBER | DATE OF REVISION | PROJECT HANDLER | REVIEWED BY | REVISION NOTE |
|------------|------------------|-----------------|-------------|---------------|
| None | | | | |