

# VISUAL COMFORT AND COMPANY TEST REPORT

## SCOPE OF WORK

LED Performance Testing

## MODEL NUMBER

ENCY2RS-L129303D-UNV-WW

## PROJECT NUMBER

G104659241

## REPORT NUMBER

104659241CRT-005

## ISSUE DATE

8/19/2021

## REVISED DATE

None

## TEST DATES

8/17/21 through 8/19/21

## DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-3407

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## PAGES

12

**REPORT NUMBER**

104659241CRT-005

**MODEL NUMBER(s)**

ENCY2RS-L129303D-UNV-WW

**REPORT RENDERED TO:**

VISUAL COMFORT AND COMPANY

7400 LINDER AVE

SKOKIE, IL 60077

USA

**STATEMENT OF LIMITATION**

NVLAP Lab Code 100402-0. 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-01166088-0.

**TEST STANDARDS**

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting

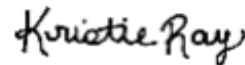
ANSI NEMA ANSLG C78.377: 2017: Specifications for the Chromaticity of Solid State Lighting (SSL) Products

In Charge of Testing:



Gerald Gray  
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Reviewer:



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**SAMPLE INFORMATION**

**REPORT NO. 104659241CRT-005**

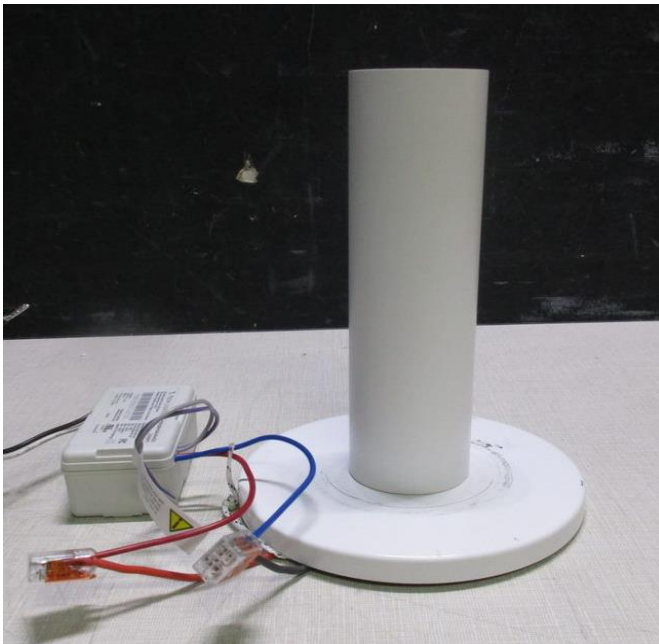
**ITEMS RECEIVED**

| Item No. | Control No.         | Model No.          | Description | Type       | Received  |
|----------|---------------------|--------------------|-------------|------------|-----------|
| 1        | CRT2108101057-001-2 | PTB15W-0300-42     | Driver      | Production | 8/10/2021 |
| 2        | CRT2108101057-001-5 | BXRE-30-G1000-C-83 | LED         | Production | 8/10/2021 |
| 3        | CRT2108101057-001-8 | 30°                | Optic       | Production | 8/10/2021 |

**TESTED SAMPLE CONFIGURATIONS**

| Config No. | Tested Model No.        | Item Nos. Utilized |
|------------|-------------------------|--------------------|
| 1          | ENCY2RS-L129303D-UNV-WW | 1,2,3              |

**SAMPLE PHOTOS - TESTED CONFIGURATIONS**



## SUMMARY

REPORT NO. 104659241CRT-005

### PRODUCT INFORMATION AND SUMMARY OF DATA

|                      |  |
|----------------------|--|
| Product Model No.:   | ENCY2RS-L129303D-UNV-WW                            |
| Product Description: | 2 Inch Cylinder Downlight, 90 CRI, 3000K 30° optic |
| LED Model No.:       | BXRE-30-G1000-C-83                                 |
| Driver Model No.:    | PTB15W-0300-42                                     |
| Light Source:        | LED  |

| Criteria                           | Results         |                    |
|------------------------------------|-----------------|--------------------|
|                                    | Goniophotometer | Integrating Sphere |
| Light Output (lumens)              | 947.4           | 979.1              |
| Input Power (W) @ 120 (Vac)        | 11.05           | 11.05              |
| Lumen Efficacy (lm/W)              | 85.7            | 88.6               |
| Input Power Factor (I) @ 120 (Vac) | 0.988           | 0.986              |

| Criteria                         | Results |
|----------------------------------|---------|
| Input ATHD (%) @ 120 (Vac)       | 11.81   |
| Correlated Color Temperature (K) | 3038    |
| Color Rendering Index - Ra (I)   | 92.7    |
| Color Rendering Index - R9 (I)   | 78.3    |
| Duv (I)                          | 0.0013  |
| Chromaticity Coordinate (x)      | 0.432   |
| Chromaticity Coordinate (y)      | 0.399   |
| Chromaticity Coordinate (u')     | 0.250   |
| Chromaticity Coordinate (v')     | 0.519   |

## TEST METHODS

### SEASONING IN SAMPLE ORIENTATION - LED PRODUCTS

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

### INTEGRATING SPHERE TESTING

A spectroradiometer and integrating sphere were used to measure the spectral distribution for each EUT resulting in photometric and colorimetric data. Electrical measurements of the unit were measured using a power analyzer. Each EUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature was measured at a position inside the sphere and stabilization procedures to LM-79 were followed.

### TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

A Type C Mirror Goniophotometer system was used to measure the luminous intensity (candela) at each angle of distribution for the EUT. Electrical measurements of the unit were measured using a power analyzer. Each EUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature was measured at a position near the EUT at equal height and stabilization procedures to LM-79 were followed.

**TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING**

**REPORT NO. 104659241CRT-005**

| Test Configuration | Tested Model No.        | Pass/Fail/NA |
|--------------------|-------------------------|--------------|
| 1                  | ENCY2RS-L129303D-UNV-WW | NA           |

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

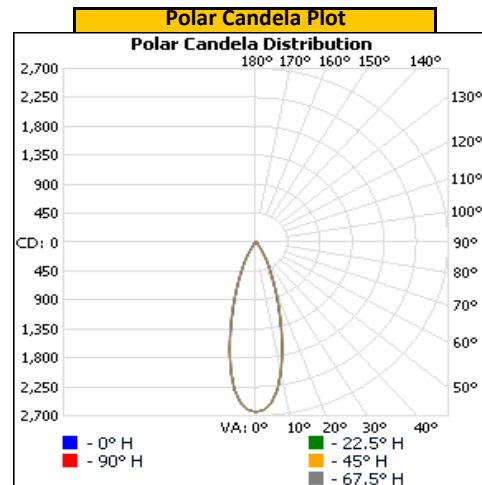
| Base Orientation | Input Voltage (Vac) | Input Current (mA) | Input Power (W) | Input Power Factor ( ) |
|------------------|---------------------|--------------------|-----------------|------------------------|
| Up               | 120.06              | 93.2               | 11.05           | 0.988                  |

| Light Output (lm) | Lumen Efficacy (lm/W) |
|-------------------|-----------------------|
| 947.4             | 85.7                  |

**INTENSITY SUMMARY - CANDELA**

| Angle | 0    | 22.5 | 45   | 67.5 | 90   |
|-------|------|------|------|------|------|
| 0     | 2638 | 2638 | 2638 | 2638 | 2638 |
| 5     | 2501 | 2499 | 2498 | 2508 | 2502 |
| 10    | 2031 | 2026 | 2035 | 2041 | 2036 |
| 15    | 1370 | 1382 | 1389 | 1385 | 1365 |
| 20    | 821  | 830  | 842  | 836  | 816  |
| 25    | 458  | 462  | 471  | 474  | 454  |
| 30    | 237  | 241  | 245  | 241  | 227  |
| 35    | 98   | 99   | 100  | 100  | 96   |
| 40    | 52   | 52   | 53   | 53   | 52   |
| 45    | 37   | 37   | 38   | 38   | 38   |
| 50    | 25   | 25   | 25   | 25   | 25   |
| 55    | 15   | 15   | 15   | 15   | 15   |
| 60    | 12   | 12   | 12   | 12   | 12   |
| 65    | 9    | 9    | 9    | 9    | 9    |
| 70    | 6    | 6    | 6    | 6    | 6    |
| 75    | 3    | 3    | 3    | 3    | 3    |
| 80    | 0    | 0    | 0    | 0    | 0    |
| 85    | 0    | 0    | 0    | 0    | 0    |
| 90    | 0    | 0    | 0    | 0    | 0    |
| 95    | 0    | 0    | 0    | 0    | 0    |
| 100   | 0    | 0    | 0    | 0    | 0    |
| 105   | 0    | 0    | 0    | 0    | 0    |
| 110   | 0    | 0    | 0    | 0    | 0    |
| 115   | 0    | 0    | 0    | 0    | 0    |
| 120   | 0    | 0    | 0    | 0    | 0    |
| 125   | 0    | 0    | 0    | 0    | 0    |
| 130   | 0    | 0    | 0    | 0    | 0    |
| 135   | 0    | 0    | 0    | 0    | 0    |
| 140   | 0    | 0    | 0    | 0    | 0    |
| 145   | 0    | 0    | 0    | 0    | 0    |
| 150   | 0    | 0    | 0    | 0    | 0    |
| 155   | 0    | 0    | 0    | 0    | 0    |
| 160   | 0    | 0    | 0    | 0    | 0    |
| 165   | 0    | 0    | 0    | 0    | 0    |
| 170   | 0    | 0    | 0    | 0    | 0    |
| 175   | 0    | 0    | 0    | 0    | 0    |
| 180   | 0    | 0    | 0    | 0    | 0    |

Entire luminous intensity matrix found in .IES file



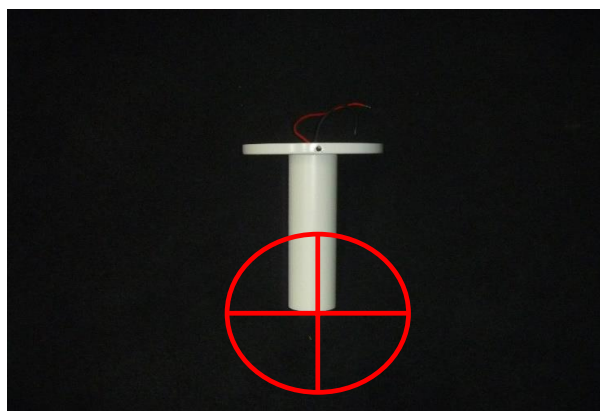
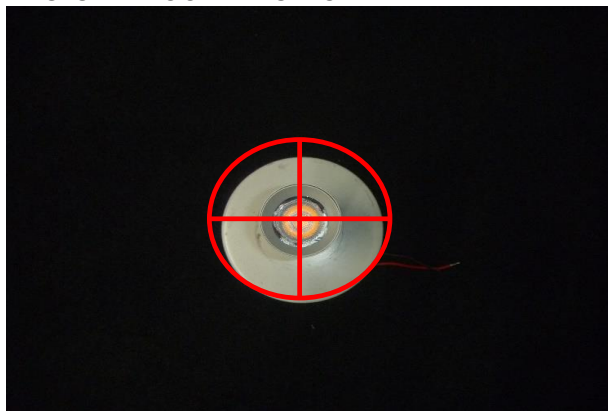
REPORT NO. 104659241CR1-005

**ORIENTATION AND ALIGNMENT OF EUT**

| Luminous Opening |            |             |
|------------------|------------|-------------|
| Length (ft)      | Width (ft) | Height (ft) |
| 0.14             | 0.14       | 0.00        |
| 0°-180° H        | 90°-270° H | 0°-180° V   |

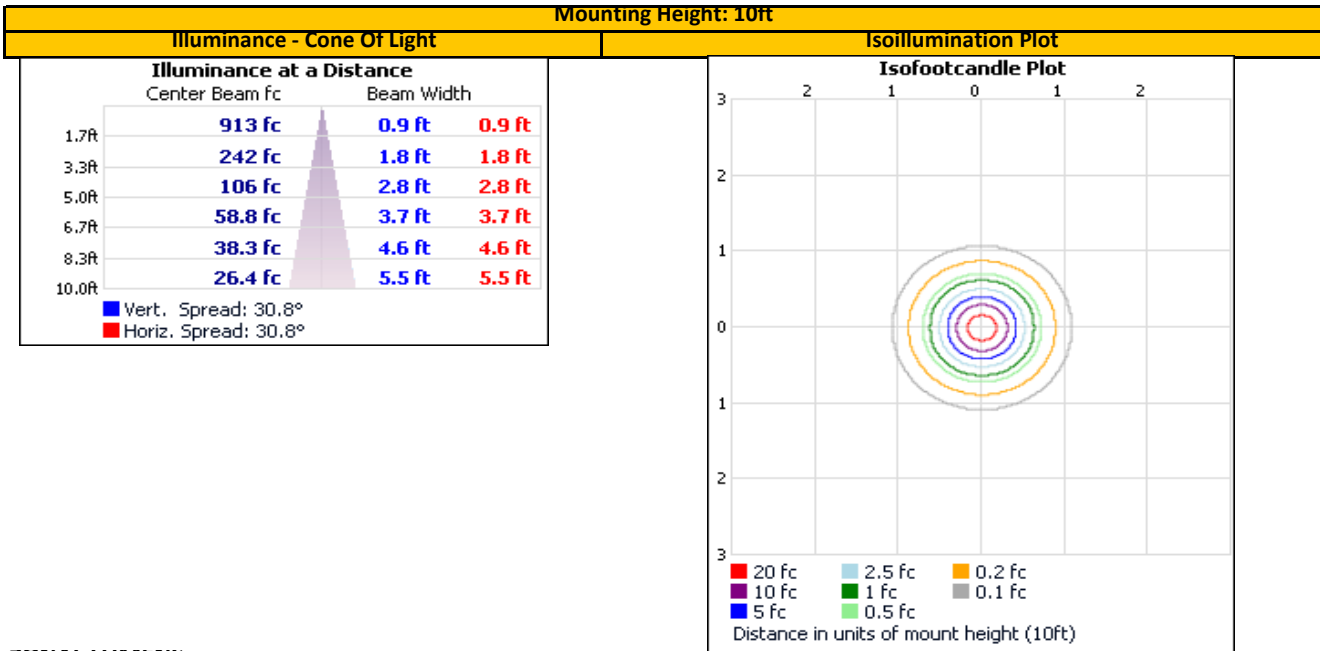
| Test Distance (ft) |
|--------------------|
| 29.6               |

**PHOTOMETRIC CENTER OF EUT**



REPORT NO. 104659241CR1-005

## ILLUMINANCE SUMMARY



## ZONAL LUMENS

| Zonal Lumen Summary |        |           |         |        |       |
|---------------------|--------|-----------|---------|--------|-------|
| Zone                | Lumens | Luminaire | Zone    | Lumens | Total |
| 0-30                | 820.7  | 86.6%     | 0-10    | 223.0  | 23.5% |
| 0-40                | 891.9  | 94.1%     | 10-20   | 378.1  | 39.9% |
| 0-60                | 935.5  | 98.7%     | 20-30   | 219.5  | 23.2% |
| 60-90               | 11.9   | 1.3%      | 30-40   | 71.2   | 7.5%  |
| 70-100              | 3.0    | 0.3%      | 40-50   | 29.0   | 3.1%  |
| 90-120              | 0.0    | 0.0%      | 50-60   | 14.6   | 1.5%  |
| 0-90                | 947.4  | 100.0%    | 60-70   | 8.9    | 0.9%  |
| 90-180              | 0.0    | 0.0%      | 70-80   | 3.0    | 0.3%  |
| 0-180               | 947.4  | 100.0%    | 80-90   | 0.0    | 0.0%  |
|                     |        |           | 90-100  | 0.0    | 0.0%  |
|                     |        |           | 100-110 | 0.0    | 0.0%  |
|                     |        |           | 110-120 | 0.0    | 0.0%  |
|                     |        |           | 120-130 | 0.0    | 0.0%  |
|                     |        |           | 130-140 | 0.0    | 0.0%  |
|                     |        |           | 140-150 | 0.0    | 0.0%  |
|                     |        |           | 150-160 | 0.0    | 0.0%  |
|                     |        |           | 160-170 | 0.0    | 0.0%  |
|                     |        |           | 170-180 | 0.0    | 0.0%  |

**REPORT NO. 104659241CRT-005**

**UNIFIED GLARE RATING (UGR) SUMMARY**

| Reflectances   |    |    |    |    |    |
|----------------|----|----|----|----|----|
| Ceiling Cavity | 70 | 70 | 50 | 50 | 30 |
| Walls          | 50 | 30 | 50 | 30 | 30 |
| Floor Cavity   | 20 | 20 | 20 | 20 | 20 |

| Room Size |      |
|-----------|------|
| X=2H      | Y=2H |
|           | 3H   |
|           | 4H   |
|           | 6H   |
|           | 8H   |
|           | 12H  |

| UGR Viewed Crosswise |      |      |      |      |
|----------------------|------|------|------|------|
| 13.3                 | 14.3 | 13.7 | 14.6 | 14.9 |
| 14.6                 | 15.5 | 15.0 | 15.8 | 16.2 |
| 14.8                 | 15.6 | 15.2 | 15.9 | 16.3 |
| 14.8                 | 15.5 | 15.2 | 15.9 | 16.3 |
| 14.7                 | 15.4 | 15.1 | 15.8 | 16.2 |
| 14.6                 | 15.3 | 15.1 | 15.7 | 16.1 |

|    |     |
|----|-----|
| 4H | 2H  |
|    | 3H  |
|    | 4H  |
|    | 6H  |
|    | 8H  |
|    | 12H |

|      |      |      |      |      |
|------|------|------|------|------|
| 13.7 | 14.5 | 14.1 | 14.9 | 15.3 |
| 15.1 | 15.8 | 15.5 | 16.2 | 16.6 |
| 15.4 | 15.9 | 15.8 | 16.4 | 16.8 |
| 15.3 | 15.8 | 15.8 | 16.3 | 16.7 |
| 15.3 | 15.7 | 15.7 | 16.2 | 16.6 |
| 15.2 | 15.6 | 15.7 | 16.1 | 16.6 |

|    |     |
|----|-----|
| 8H | 4H  |
|    | 6H  |
|    | 8H  |
|    | 12H |

|      |      |      |      |      |
|------|------|------|------|------|
| 15.3 | 15.8 | 15.8 | 16.2 | 16.7 |
| 15.3 | 15.7 | 15.8 | 16.2 | 16.6 |
| 15.2 | 15.5 | 15.8 | 16.1 | 16.6 |
| 15.2 | 15.4 | 15.7 | 15.9 | 16.5 |

|     |    |
|-----|----|
| 12H | 4H |
|     | 6H |
|     | 8H |

|      |      |      |      |      |
|------|------|------|------|------|
| 15.3 | 15.7 | 15.8 | 16.2 | 16.6 |
| 15.2 | 15.5 | 15.8 | 16.0 | 16.6 |
| 15.2 | 15.4 | 15.7 | 15.9 | 16.5 |

| Room Size |      |
|-----------|------|
| X=2H      | Y=2H |
|           | 3H   |
|           | 4H   |
|           | 6H   |
|           | 8H   |
|           | 12H  |

| UGR Viewed Endwise |      |      |      |      |
|--------------------|------|------|------|------|
| 13.3               | 14.2 | 13.6 | 14.5 | 14.9 |
| 14.5               | 15.3 | 14.9 | 15.7 | 16.0 |
| 14.7               | 15.5 | 15.1 | 15.8 | 16.2 |
| 14.6               | 15.4 | 15.1 | 15.7 | 16.1 |
| 14.6               | 15.2 | 15.0 | 15.6 | 16.0 |
| 14.5               | 15.2 | 14.9 | 15.5 | 16.0 |

|    |     |
|----|-----|
| 4H | 2H  |
|    | 3H  |
|    | 4H  |
|    | 6H  |
|    | 8H  |
|    | 12H |

|      |      |      |      |      |
|------|------|------|------|------|
| 13.7 | 14.5 | 14.1 | 14.8 | 15.2 |
| 15.0 | 15.7 | 15.4 | 16.1 | 16.5 |
| 15.2 | 15.8 | 15.7 | 16.3 | 16.7 |
| 15.2 | 15.7 | 15.7 | 16.2 | 16.6 |
| 15.1 | 15.6 | 15.6 | 16.1 | 16.5 |
| 15.1 | 15.5 | 15.6 | 16.0 | 16.4 |

|    |     |
|----|-----|
| 8H | 4H  |
|    | 6H  |
|    | 8H  |
|    | 12H |

|      |      |      |      |      |
|------|------|------|------|------|
| 15.2 | 15.7 | 15.7 | 16.1 | 16.6 |
| 15.2 | 15.6 | 15.7 | 16.1 | 16.5 |
| 15.1 | 15.4 | 15.7 | 16.0 | 16.5 |
| 15.1 | 15.3 | 15.6 | 15.8 | 16.4 |

|     |    |
|-----|----|
| 12H | 4H |
|     | 6H |
|     | 8H |

|      |      |      |      |      |
|------|------|------|------|------|
| 15.2 | 15.6 | 15.7 | 16.1 | 16.5 |
| 15.1 | 15.4 | 15.7 | 15.9 | 16.5 |
| 15.1 | 15.3 | 15.6 | 15.8 | 16.4 |

| Maximum UGR |  |
|-------------|--|
| 16.8        |  |



**INTEGRATING SPHERE TESTING**

**REPORT NO. 104659241CRT-005**

| Test Configuration | Tested Model No.        | Pass/Fail/NA |
|--------------------|-------------------------|--------------|
| 1                  | ENCY2RS-L129303D-UNV-WW | NA           |

**PHOTOMETRIC, COLORIMETRIC, AND ELECTRICAL MEASUREMENTS (25°C +/- 1°C)**

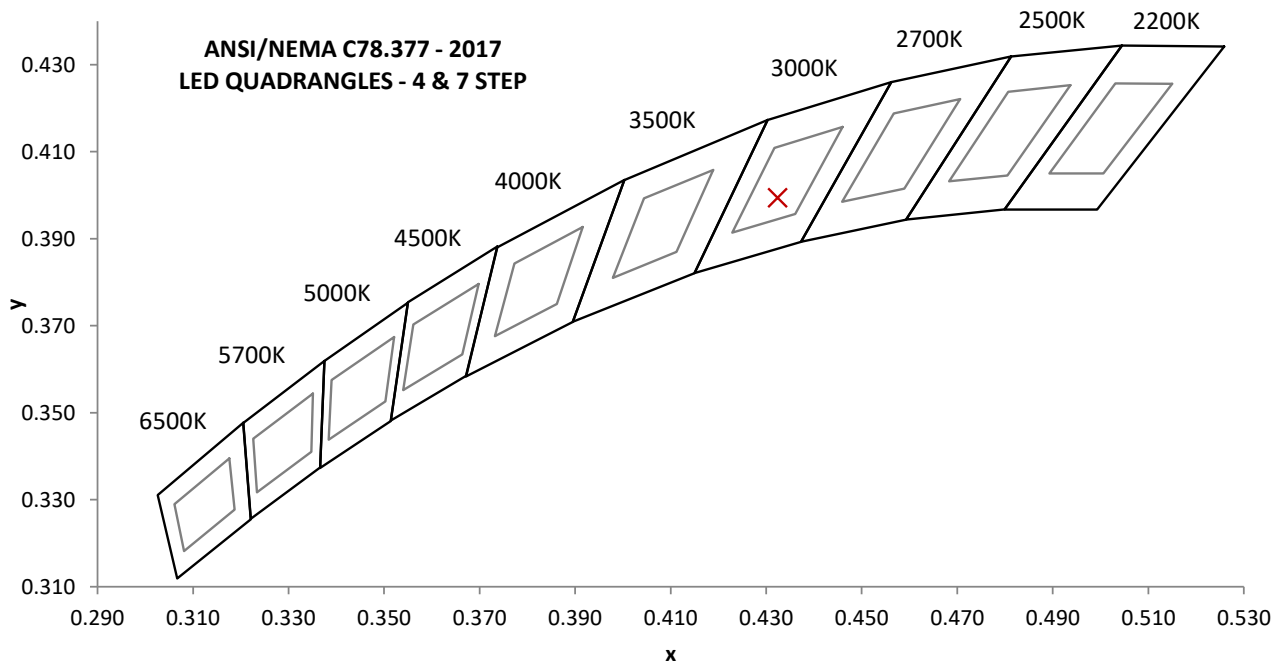
| Base Orientation |
|------------------|
| Up               |

| Input Voltage (Vac) | Input Current (mA) | Input Power (W) | Input Power Factor (I) | Input ATHD (%) |
|---------------------|--------------------|-----------------|------------------------|----------------|
| 120.03              | 93.4               | 11.05           | 0.986                  | 11.81          |

Measured at 120.03(Vac)

| Light Output (lm) | Lumen Efficacy (lm/W) | CCT (K) | CRI - Ra (I) | CRI - R9 (I) |
|-------------------|-----------------------|---------|--------------|--------------|
| 979.1             | 88.6                  | 3038    | 92.7         | 78.3         |

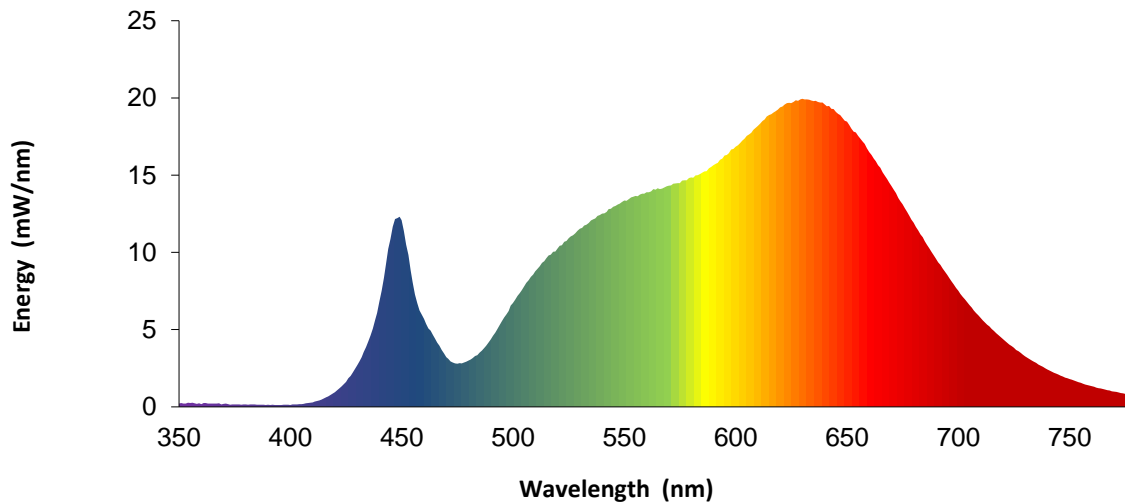
| Duv (I) | 1931 Chrom (x) | 1931 Chrom (y) | 1976 Chrom (u') | 1976 Chrom (v') |
|---------|----------------|----------------|-----------------|-----------------|
| 0.0013  | 0.432          | 0.399          | 0.250           | 0.519           |



**REPORT NO. 104659241CRT-005**

**SPECTRAL DISTRIBUTION OVER WAVELENGTHS**

| nm  | mW/nm |  | nm  | mW/nm |  | nm  | mW/nm |  | nm  | mW/nm |
|-----|-------|--|-----|-------|--|-----|-------|--|-----|-------|
| 350 | 0.2   |  | 460 | 5.7   |  | 570 | 14.3  |  | 680 | 11.9  |
| 355 | 0.2   |  | 465 | 4.4   |  | 575 | 14.5  |  | 685 | 10.7  |
| 360 | 0.2   |  | 470 | 3.2   |  | 580 | 14.8  |  | 690 | 9.6   |
| 365 | 0.2   |  | 475 | 2.8   |  | 585 | 15.2  |  | 695 | 8.5   |
| 370 | 0.2   |  | 480 | 3.0   |  | 590 | 15.6  |  | 700 | 7.5   |
| 375 | 0.2   |  | 485 | 3.5   |  | 595 | 16.3  |  | 705 | 6.6   |
| 380 | 0.2   |  | 490 | 4.4   |  | 600 | 16.8  |  | 710 | 5.8   |
| 385 | 0.1   |  | 495 | 5.5   |  | 605 | 17.5  |  | 715 | 5.0   |
| 390 | 0.1   |  | 500 | 6.7   |  | 610 | 18.2  |  | 720 | 4.4   |
| 395 | 0.1   |  | 505 | 7.8   |  | 615 | 18.9  |  | 725 | 3.8   |
| 400 | 0.1   |  | 510 | 8.8   |  | 620 | 19.4  |  | 730 | 3.3   |
| 405 | 0.2   |  | 515 | 9.6   |  | 625 | 19.7  |  | 735 | 2.8   |
| 410 | 0.3   |  | 520 | 10.3  |  | 630 | 19.9  |  | 740 | 2.4   |
| 415 | 0.5   |  | 525 | 10.9  |  | 635 | 19.8  |  | 745 | 2.1   |
| 420 | 1.0   |  | 530 | 11.5  |  | 640 | 19.6  |  | 750 | 1.8   |
| 425 | 1.6   |  | 535 | 12.1  |  | 645 | 19.1  |  | 755 | 1.6   |
| 430 | 2.7   |  | 540 | 12.5  |  | 650 | 18.5  |  | 760 | 1.3   |
| 435 | 4.2   |  | 545 | 12.9  |  | 655 | 17.6  |  | 765 | 1.1   |
| 440 | 6.8   |  | 550 | 13.4  |  | 660 | 16.5  |  | 770 | 1.0   |
| 445 | 10.9  |  | 555 | 13.7  |  | 665 | 15.5  |  | 775 | 0.8   |
| 450 | 12.1  |  | 560 | 13.9  |  | 670 | 14.3  |  | 780 | 0.7   |
| 455 | 8.0   |  | 565 | 14.2  |  | 675 | 13.1  |  | --- | ---   |



Portrayed color in graphic is estimated by wavelength (nm) and may not be exact - it is a visual representation only

**SEE ANNEX A FOR TM-30 REPORT**

**EQUIPMENT LIST**

**REPORT NO. 104659241CRT-005**

| #  | Equipment                                 | Model No   | Control No. | Last Cal  | Cal Due    |
|----|---|------------|-------------|-----------|------------|
| 1  | Elgar AC Power Supply                     | CW1251     | ---         | VBU       | VBU        |
| 2  | Sorenson DC Power Supply                  | XFR 150-8  | ---         | VBU       | VBU        |
| 3  | Traceable Hygrothermometer                | 4800       | L206        | 2/12/2021 | 2/12/2022  |
| 4  | Yokogawa Power Analyzer                   | WT1600     | E474        | 6/15/2021 | 6/15/2022  |
| 5  | Fluke Thermometer                         | 53 II      | D587        | 2/5/2021  | 2/5/2022   |
| 6  | 3M Integrating Sphere Spectrometer System | CDS 1100   | O235        | 7/26/2021 | 10/26/2021 |
| 7  | Fisher Scientific Stopwatch               | 14-649-9   | N1132       | 3/26/2021 | 3/26/2022  |
| 8  | LSI High Speed Mirror Goniophotometer     | 6440       | ---         | 8/16/2021 | 11/16/2021 |
| 9  | Elgar AC Power Supply                     | CW1251     | ---         | VBU       | VBU        |
| 10 | Yokogawa Power Analyzer                   | WT210      | E464        | 5/11/2021 | 5/11/2022  |
| 11 | Traceable Hygrothermometer                | 4800       | L204        | 2/21/2021 | 2/21/2022  |
| 12 | Sorenson DC Power Supply                  | XG 150-10  | ---         | VBU       | VBU        |
| 13 | Omega Thermometer                         | DPI8-C24   | M263        | 3/23/2021 | 3/23/2022  |
| 14 | Bosch Distance Laser                      | Pro GLM 20 | L211        | 3/3/2021  | 3/3/2022   |
| 15 | M-D Building Products Digital Level       | Smart Tool | L112        | 5/26/2021 | 5/26/2022  |

**REVISION HISTORY**

| #   | Revision Date | Updated By | Reviewed By | Description of Change |
|-----|---------------|------------|-------------|-----------------------|
| --- | None          | ---        | ---         | ---                   |
| --- | ---           | ---        | ---         | ---                   |
| --- | ---           | ---        | ---         | ---                   |

**ANNEX A - TM-30 CALCULATIONS**

**REPORT NO. 104659241CRT-005**

| Test Configuration | Tested Model No.        | Pass/Fail/NA |
|--------------------|-------------------------|--------------|
| 1                  | ENCY2RS-L129303D-UNV-WW | NA           |

**TM-30 REPORT**

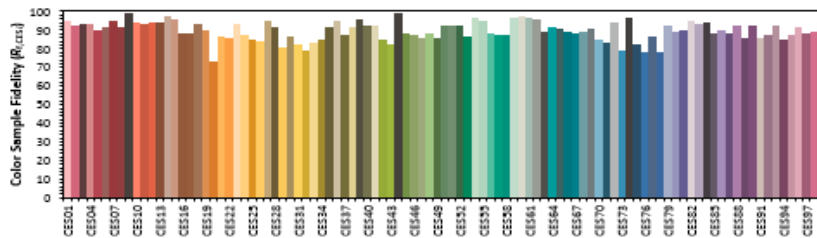
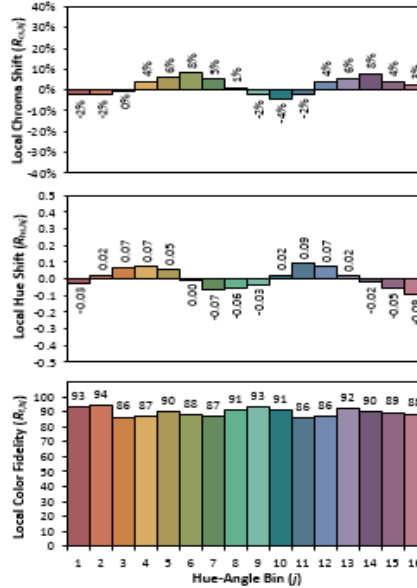
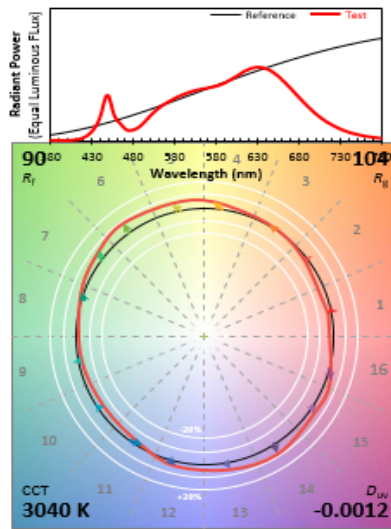
**ANSI/IES TM-30-18 Color Rendition Report**

Source: 104659241CRT-005

Manufacturer: VISUAL COMFORT AND COMPANY

Date: 8/19/2021

Model: ENCY2RS-L129303D-UNV-WW



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  0.4324  
 $y$  0.3994  
 $u'$  0.2496  
 $v'$  0.5188

Colors are for visual orientation purposes only. Created with the IES TM-30-18 Calculator Version 2.00.