

REPORT NUMBER: ITL80216

PAGE: 1 OF 5

ISSUE DATE: 12/18/13

PREPARED FOR: RAB LIGHTING, INC.

CATALOG NUMBER: PANEL2X2-41Y

LUMINAIRE: FABRICATED WHITE PAINTED METAL HOUSING, 2 WHITE CIRCUIT BOARDS
EACH WITH 120 LEDS, FROSTED HOLOGRAPHIC PLASTIC DIFFUSER. DIFFUSER
FROSTED SIDE UP.

LAMPS: TWO HUNDRED FORTY WHITE LIGHT EMITTING DIODES (LEDs), VERTICAL
BASE-UP POSITION.

TOTAL INPUT WATTS = 39.4 AT 120.0 VOLTS

MOUNTING: RECESSED

LED DRIVER: RAB RD-052-A1050-R-080C

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE
PROVIDED AT RATED INPUT VOLTAGE
(120VAC, 60Hz) TO THE LED DRIVER.

TEST PROCEDURE: IESNA LM-79-08

TEST DISTANCE = 35.0 FEET

CANDELA DISTRIBUTION

| | 0.0 | 22.5 | 45.0 | 67.5 | 90.0 | |
|----|------|------|------|------|------|-----|
| 0 | 1333 | 1333 | 1333 | 1333 | 1333 | |
| 5 | 1326 | 1327 | 1327 | 1327 | 1326 | 126 |
| 15 | 1269 | 1270 | 1270 | 1270 | 1270 | 358 |
| 25 | 1159 | 1159 | 1160 | 1160 | 1159 | 534 |
| 35 | 1005 | 1004 | 1004 | 1006 | 1004 | 628 |
| 45 | 822 | 823 | 822 | 824 | 822 | 635 |
| 55 | 623 | 626 | 624 | 625 | 627 | 559 |
| 65 | 418 | 420 | 420 | 421 | 422 | 416 |
| 75 | 218 | 217 | 217 | 218 | 218 | 230 |
| 85 | 43 | 42 | 43 | 43 | 42 | 54 |
| 90 | 0 | 0 | 0 | 0 | 0 | |

FLUX

ZONAL LUMEN SUMMARY

| ZONE | LUMENS | %FIXT |
|--------|--------|-------|
| 0- 30 | 1018 | 28.8 |
| 0- 40 | 1646 | 46.5 |
| 0- 60 | 2840 | 80.2 |
| 0- 90 | 3540 | 100.0 |
| 90-180 | 0 | 0.0 |
| 0-180 | 3540 | 100.0 |

EFFICACY = 89.8 lm/W

CIE TYPE - DIRECT

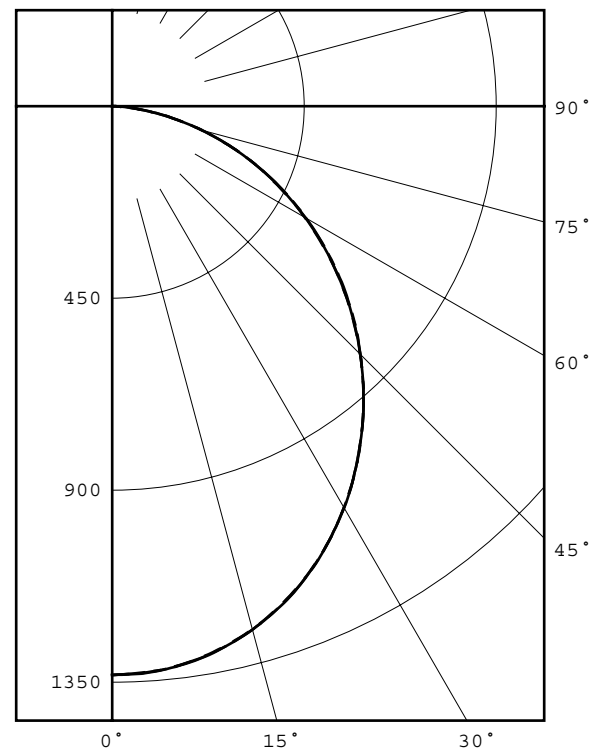
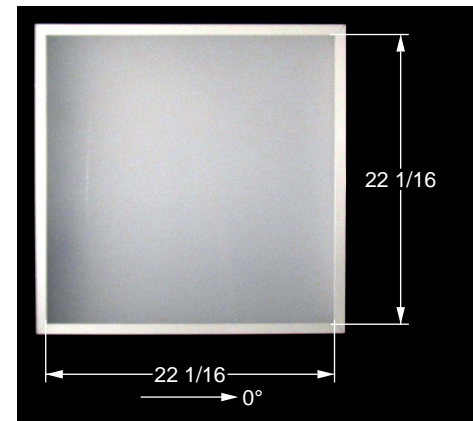
PLANE : 0-DEG 90-DEG

SPACING CRITERIA : 1.21 1.21

LUMINOUS LENGTH : 22.063 22.063

LUMINANCE DATA IN CANDELA/SQ M

| ANGLE IN DEG | AVERAGE 0-DEG | AVERAGE 45-DEG | AVERAGE 90-DEG |
|--------------|---------------|----------------|----------------|
| 45 | 3702. | 3702. | 3702. |
| 55 | 3459. | 3464. | 3481. |
| 65 | 3150. | 3165. | 3180. |
| 75 | 2682. | 2670. | 2682. |
| 85 | 1571. | 1571. | 1535. |



LEGEND:

0-deg - - - - -
45-deg - - - - -
90-deg - - - - -

Checked M KLOPF
Approved R BEATTIE
Lighting Engineer



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CANDELA DISTRIBUTION LATERAL ANGLE

| | 0.0 | 22.5 | 45.0 | 67.5 | 90.0 |
|------|------|------|------|------|------|
| 0.0 | 1333 | 1333 | 1333 | 1333 | 1333 |
| 2.5 | 1331 | 1332 | 1332 | 1331 | 1330 |
| 5.0 | 1326 | 1327 | 1327 | 1327 | 1326 |
| 7.5 | 1317 | 1318 | 1318 | 1318 | 1317 |
| 10.0 | 1304 | 1305 | 1306 | 1305 | 1305 |
| 12.5 | 1288 | 1289 | 1289 | 1289 | 1289 |
| 15.0 | 1269 | 1270 | 1270 | 1270 | 1270 |
| 17.5 | 1246 | 1247 | 1247 | 1247 | 1247 |
| 20.0 | 1220 | 1221 | 1222 | 1222 | 1221 |
| 22.5 | 1191 | 1191 | 1192 | 1193 | 1192 |
| 25.0 | 1159 | 1159 | 1160 | 1160 | 1159 |
| 27.5 | 1124 | 1123 | 1124 | 1125 | 1124 |
| 30.0 | 1086 | 1086 | 1087 | 1087 | 1086 |
| 32.5 | 1047 | 1046 | 1047 | 1048 | 1047 |
| 35.0 | 1005 | 1004 | 1004 | 1006 | 1004 |
| 37.5 | 961 | 961 | 961 | 962 | 961 |
| 40.0 | 916 | 916 | 916 | 917 | 917 |
| 42.5 | 870 | 869 | 870 | 871 | 870 |
| 45.0 | 822 | 823 | 822 | 824 | 822 |
| 47.5 | 773 | 776 | 774 | 775 | 777 |
| 50.0 | 724 | 725 | 725 | 726 | 727 |
| 52.5 | 674 | 675 | 674 | 676 | 678 |
| 55.0 | 623 | 626 | 624 | 625 | 627 |
| 57.5 | 572 | 575 | 574 | 575 | 576 |
| 60.0 | 521 | 523 | 523 | 523 | 525 |
| 62.5 | 470 | 472 | 471 | 473 | 473 |
| 65.0 | 418 | 420 | 420 | 421 | 422 |
| 67.5 | 370 | 369 | 369 | 370 | 370 |
| 70.0 | 318 | 318 | 318 | 319 | 319 |
| 72.5 | 267 | 266 | 267 | 268 | 268 |
| 75.0 | 218 | 217 | 217 | 218 | 218 |
| 77.5 | 169 | 168 | 168 | 169 | 169 |
| 80.0 | 123 | 122 | 122 | 123 | 123 |
| 82.5 | 80 | 79 | 79 | 80 | 80 |
| 85.0 | 43 | 42 | 43 | 43 | 42 |
| 87.5 | 15 | 15 | 15 | 16 | 15 |
| 90.0 | 0 | 0 | 0 | 0 | 0 |



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5-DEGREE
ZONAL LUMEN SUMMARY

| | |
|--------|-----|
| 0- 5 | 32 |
| 5- 10 | 94 |
| 10- 15 | 153 |
| 15- 20 | 205 |
| 20- 25 | 250 |
| 25- 30 | 284 |
| 30- 35 | 308 |
| 35- 40 | 320 |
| 40- 45 | 322 |
| 45- 50 | 313 |
| 50- 55 | 293 |
| 55- 60 | 265 |
| 60- 65 | 229 |
| 65- 70 | 187 |
| 70- 75 | 140 |
| 75- 80 | 91 |
| 80- 85 | 44 |
| 85- 90 | 10 |

10-DEGREE
ZONAL LUMEN SUMMARY

| | |
|-------|------|
| 0- 10 | 126 |
| 0- 20 | 484 |
| 0- 30 | 1018 |
| 0- 40 | 1646 |
| 0- 50 | 2281 |
| 0- 60 | 2840 |
| 0- 70 | 3256 |
| 0- 80 | 3486 |
| 0- 90 | 3540 |



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COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE 0.20

| RC | 80 | | | | 70 | | | | 50 | | | 30 | | | 10 | | | 0 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RW | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| 0 | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |
| 1 | 109 | 104 | 100 | 96 | 106 | 102 | 98 | 95 | 98 | 95 | 92 | 94 | 91 | 89 | 90 | 88 | 86 | 84 |
| 2 | 99 | 91 | 84 | 79 | 97 | 89 | 83 | 78 | 86 | 81 | 76 | 82 | 78 | 74 | 79 | 76 | 73 | 71 |
| 3 | 91 | 80 | 72 | 66 | 88 | 79 | 71 | 65 | 76 | 69 | 64 | 73 | 67 | 63 | 70 | 66 | 62 | 60 |
| 4 | 83 | 71 | 62 | 56 | 81 | 70 | 62 | 55 | 67 | 60 | 55 | 65 | 59 | 54 | 63 | 58 | 53 | 51 |
| 5 | 76 | 64 | 55 | 48 | 74 | 63 | 54 | 48 | 60 | 53 | 47 | 58 | 52 | 47 | 57 | 51 | 46 | 44 |
| 6 | 71 | 57 | 49 | 42 | 69 | 56 | 48 | 42 | 55 | 47 | 42 | 53 | 46 | 41 | 51 | 45 | 41 | 39 |
| 7 | 66 | 52 | 43 | 37 | 64 | 51 | 43 | 37 | 50 | 42 | 37 | 48 | 42 | 37 | 47 | 41 | 36 | 34 |
| 8 | 61 | 48 | 39 | 33 | 59 | 47 | 39 | 33 | 46 | 38 | 33 | 44 | 38 | 33 | 43 | 37 | 33 | 31 |
| 9 | 57 | 44 | 36 | 30 | 56 | 43 | 35 | 30 | 42 | 35 | 30 | 41 | 34 | 30 | 40 | 34 | 29 | 28 |
| 10 | 54 | 40 | 33 | 27 | 52 | 40 | 32 | 27 | 39 | 32 | 27 | 38 | 32 | 27 | 37 | 31 | 27 | 25 |

ALL CANDELA, LUMENS, LUMINANCE, AND VCP VALUES IN THIS REPORT ARE BASED ON ABSOLUTE PHOTOMETRY. THE COEFFICIENT OF UTILIZATION VALUES ARE BASED ON THE TOTAL ABSOLUTE LUMEN OUTPUT OF THIS TEST SAMPLE.



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ADDRESS: 170 LUDLOW AVE
NORTHVALE, NJ 07647

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CATALOG NUMBER: PANEL2X2-41Y

ADDRESS: 170 LUDLOW AVE
NORTHVALE, NJ 07647

LUMINAIRE: FABRICATED WHITE PAINTED METAL HOUSING, 2 WHITE CIRCUIT BOARDS EACH WITH 120 LEDS, FROSTED HOLOGRAPHIC PLASTIC DIFFUSER. DIFFUSER FROSTED SIDE UP.

LAMP: TWO HUNDRED FORTY WHITE LIGHT EMITTING DIODES (LEDS), VERTICAL BASE-UP POSITION.

DRIVER: RAB RD-052-A1050-R-080C

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT RATED INPUT VOLTAGE (120.0 AND 277.0 VAC, 60Hz) TO THE LED DRIVER.

| | Calibration Due: |
|--|------------------|
| INSTRUMENTS: | |
| Associated Power Technologies APT5010 AC Power Source | N/A |
| Yokogawa WT210 Digital Power Meter #6 | 10/31/14 |
| Ocean Optics QE65000 Spectroradiometer | 10/17/14 |
| ITL 1.5m Diameter Integrating Sphere S15-2, 4PI Geometry | 10/17/14 |

OBJECT OF TEST: Measure the Total Radiant Flux*, Spectral Power Distribution (SPD), Correlated Color Temperature (CCT), Color Rendering Indices (CRI_a,1-14), Chromaticity Coordinates (x,y; u'v'), ANSI C78.377 Duv, and electrical data including ANSI C82.77-2002 Power Factor (PF) and Total Harmonic Distortion (THD) to the test sample. Report Off-State Power. Measure electrical data including Total Harmonic Distortion (THD) at maximum rated voltage.

PROCEDURE: The test sample was provided by the customer and had an unknown number of operating hours. The test sample was mounted inside the integrating sphere and allowed to stabilize. After stabilization occurred, measurements were taken. In order to measure mean performance, multiple data sets were recorded and averaged. Readings were taken with the test sample operating at 120.0 VAC input. Electrical data was also recorded at maximum nominal rated input voltage (277.0 VAC). All testing performed in a 25 +/-1 degree Celsius free air ambient and in accordance with IESNA LM-79-08. All data are traceable to the National Institute of Standards and Technology. Off-State Power was reported with no voltage applied to the sample.

*NOTE: Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even when these effects are compensated for, are likely to have a greater variation in results compared to the flux output calculated from a goniophotometric exploration since these artifacts do not affect the goniophotometric results.

RESULTS: (continued subsequent pages)

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| | |
|----------|-------------------|
| Checked | <i>N THOMAS</i> |
| Approved | <i>L GRABA</i> |
| | Lighting Engineer |



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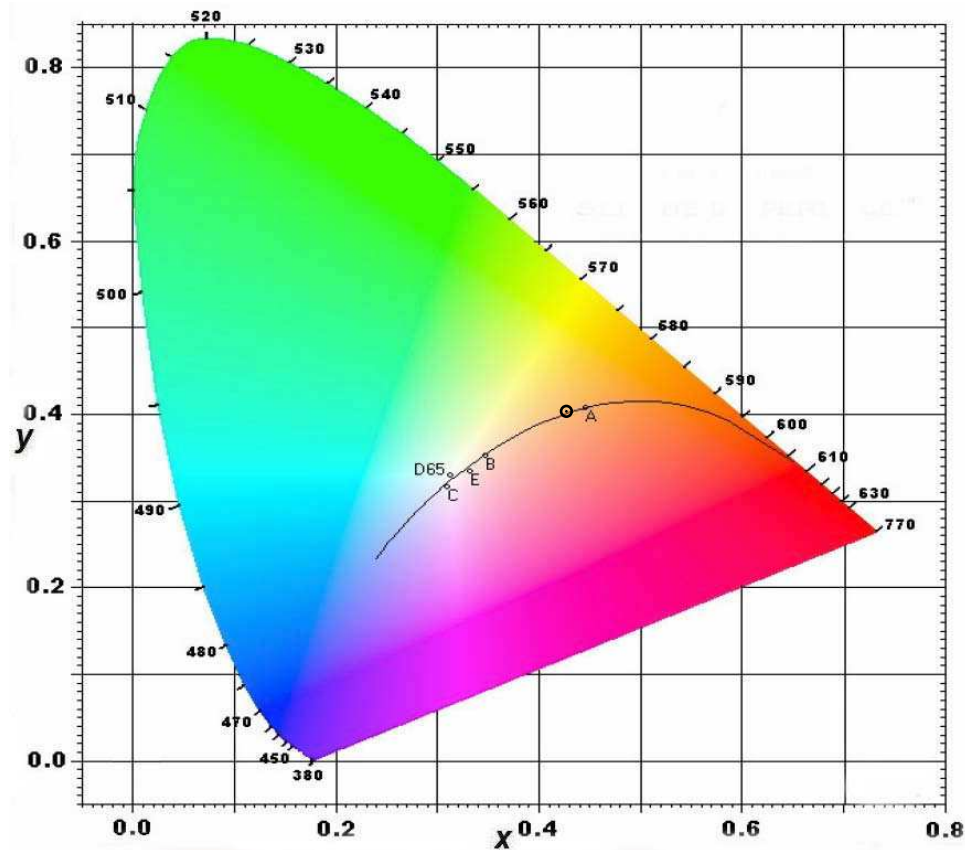
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NVLAP LAB CODE: 200925-0

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CIE Chromaticity Diagram



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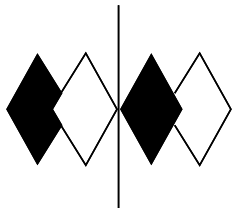
RESULTS:

| SPECTRORADIOMETRIC | |
|---------------------------------|-------------------|
| Observer | CIE 1931 2 degree |
| Chromaticity Ordinate x | 0.4269 |
| Chromaticity Ordinate y | 0.4030 |
| Observer | CIE 1976 2 degree |
| Chromaticity Ordinate u' | 0.2446 |
| Chromaticity Ordinate v' | 0.5194 |
| Correlated Color Temp CCT (K) | 3166 |
| ANSI C78.377-2008 Duv | 0.001 |
| Total Radiant Flux (milliWatts) | 11428 * |
| ELECTRICAL | |
| Input Voltage (Volts AC) | 120.0 |
| Input Current (Amps AC) | 0.330 |
| Input Power (Watts) | 39.4 |
| Input Power Factor (%) | 99.5 |
| Input Current THD (%) | 6.5 |
| Input Voltage THD (%) | 0.2 |
| Off-State Power (Watts) | |
| | 0.0 |
| ELECTRICAL AT MAX NONIMAL INPUT | |
| Input Voltage (Volts AC) | 277.0 |
| Input Current (Amps AC) | 0.157 |
| Input Power (Watts) | 40.3 |
| Input Power Factor (%) | 92.7 |
| Input Current THD (%) | 8.9 |
| Input Voltage THD (%) | 0.1 |

| COLOR RENDERING INDICES | CRI |
|---------------------------------|-----|
| Ra (Average 1-8) | 83 |
| R1 Light greyish red | 81 |
| R2 Dark greyish yellow | 87 |
| R3 Strong yellowish green | 93 |
| R4 Moderate yellowish green | 83 |
| R5 Light bluish green | 81 |
| R6 Light blue | 83 |
| R7 Light violet | 88 |
| R8 Light reddish purple | 68 |
| R9 Strong red | 23 |
| R10 Strong yellow | 71 |
| R11 Strong green | 81 |
| R12 Strong blue | 64 |
| R13 Light yellowish pink (skin) | 82 |
| R14 Moderate olive green (leaf) | 95 |

*NOTE:

Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even when these effects are compensated for, are likely to have a greater variation in results compared to the flux output calculated from a goniophotometric exploration since these artifacts do not affect the goniophotometric results.



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RESULTS:

| Wavelength | mW per nm | Wavelength | mW per nm | Wavelength | mW per nm |
|------------|-----------|------------|-----------|------------|-----------|
| 380 | 0.369 | 515 | 32.274 | 650 | 47.265 |
| 385 | 0.392 | 520 | 35.014 | 655 | 43.949 |
| 390 | 0.446 | 525 | 37.334 | 660 | 40.615 |
| 395 | 0.519 | 530 | 39.501 | 665 | 37.303 |
| 400 | 0.627 | 535 | 41.570 | 670 | 34.066 |
| 405 | 0.888 | 540 | 43.610 | 675 | 30.946 |
| 410 | 1.339 | 545 | 45.750 | 680 | 27.964 |
| 415 | 2.089 | 550 | 47.996 | 685 | 25.191 |
| 420 | 3.646 | 555 | 50.251 | 690 | 22.599 |
| 425 | 6.324 | 560 | 52.572 | 695 | 20.239 |
| 430 | 10.498 | 565 | 54.733 | 700 | 18.052 |
| 435 | 16.755 | 570 | 56.891 | 705 | 16.037 |
| 440 | 27.447 | 575 | 58.885 | 710 | 14.192 |
| 445 | 39.672 | 580 | 60.686 | 715 | 12.542 |
| 450 | 39.528 | 585 | 62.280 | 720 | 11.039 |
| 455 | 28.621 | 590 | 63.553 | 725 | 9.714 |
| 460 | 20.845 | 595 | 64.480 | 730 | 8.534 |
| 465 | 16.290 | 600 | 65.016 | 735 | 7.482 |
| 470 | 12.641 | 605 | 65.163 | 740 | 6.559 |
| 475 | 10.851 | 610 | 64.787 | 745 | 5.745 |
| 480 | 10.861 | 615 | 63.965 | 750 | 5.044 |
| 485 | 12.027 | 620 | 62.697 | 755 | 4.424 |
| 490 | 14.416 | 625 | 60.948 | 760 | 3.879 |
| 495 | 17.877 | 630 | 58.829 | 765 | 3.406 |
| 500 | 21.719 | 635 | 56.289 | 770 | 2.988 |
| 505 | 25.584 | 640 | 53.520 | 775 | 2.616 |
| 510 | 29.140 | 645 | 50.467 | 780 | 2.301 |

