

REPORT NUMBER: RAB02175

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ISSUE DATE: 07/06/16

PREPARED FOR: RAB LIGHTING INC.

CATALOG NUMBER: SK16XL20RY

LUMINAIRE: STAMPED STEEL CEILING PAN WITH WHITE FINISH, 10 LED BOARDS
EACH WITH 8 LEDS, ACRYLIC DROP LENS WITH SMOOTH FINISH.

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

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED.

TOTAL INPUT WATTS = 19.931 AT 120.0 VOLTS.

LED DRIVER: RDD-MK022-MKP45-A0700

TST PROCEDURE: IESNA LM 79-08

ACCREDITED LABORATORY CODE 201058-0

(SEE PAGE 2 FOR MORE INFORMATION)

| DEG | CANDELA | LUMENS |
|-----|---------|--------|
| 0 | 500 | |
| 5 | 498 | 47 |
| 15 | 482 | 136 |
| 25 | 449 | 207 |
| 35 | 401 | 252 |
| 45 | 344 | 266 |
| 55 | 275 | 246 |
| 65 | 202 | 200 |
| 75 | 133 | 141 |
| 85 | 80 | 88 |
| 90 | 59 | |
| 95 | 43 | 47 |
| 105 | 22 | 25 |
| 115 | 16 | 16 |
| 125 | 16 | 14 |
| 135 | 17 | 13 |
| 145 | 17 | 11 |
| 155 | 18 | 8 |
| 165 | 17 | 5 |
| 175 | 14 | 1 |
| 180 | 16 | |

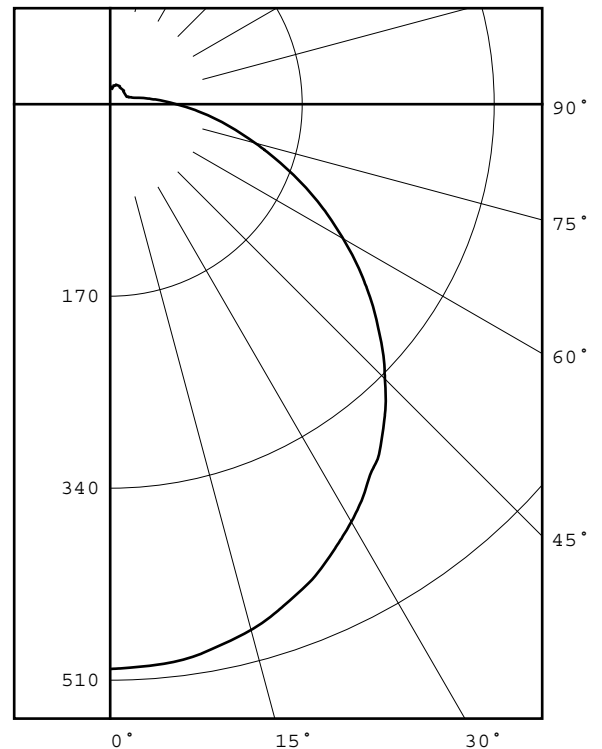
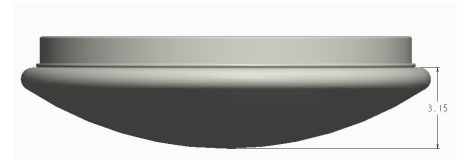
| ZONAL LUMEN | SUMMARY | |
|-------------|---------|-------|
| ZONE | LUMENS | %FIXT |
| 0- 30 | 390 | 22.6 |
| 0- 40 | 642 | 37.2 |
| 0- 60 | 1154 | 66.9 |
| 0- 90 | 1583 | 91.8 |
| 90-120 | 88 | 5.1 |
| 90-130 | 103 | 6.0 |
| 90-150 | 126 | 7.3 |
| 90-180 | 141 | 8.2 |
| 0-180 | 1724 | 100.0 |

TOTAL INPUT WATTS = 19.9

EFFICACY = 86.6 Lm/W

CIE TYPE - DIRECT

LUMINAIRE SPACING CRITERION = 1.3



| | |
|----------|----------------------|
| Checked | <u>X.CAO</u> |
| Approved | <u>D.WANG-MUNSON</u> |

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ADDITIONAL INFORMATION

TEST DISTANCE = 25.25 FEET

NOTE: THIS REPORT WITH THE USE OF THE NVLAP LOGO SHALL NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY NVLAP, NIST, OR ANY AGENCY OF THE FEDERAL GOVERNMENT.

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LUMINOUS DIAMETER: 16.000
HEIGHT OF SIDE : 3.150

LUMINANCE DATA IN CANDELA/SQ METER

ANGLE AVERAGE

IN DEG

| | |
|----|-------|
| 45 | 2998. |
| 55 | 2721. |
| 65 | 2396. |
| 75 | 2046. |
| 85 | 1830. |

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CANDELA DISTRIBUTION

| | |
|-------|-----|
| | 0.0 |
| 0.0 | 500 |
| 5.0 | 498 |
| 10.0 | 492 |
| 15.0 | 482 |
| 20.0 | 467 |
| 25.0 | 449 |
| 30.0 | 427 |
| 35.0 | 401 |
| 40.0 | 376 |
| 45.0 | 344 |
| 50.0 | 310 |
| 55.0 | 275 |
| 60.0 | 238 |
| 65.0 | 202 |
| 70.0 | 166 |
| 75.0 | 133 |
| 80.0 | 105 |
| 85.0 | 80 |
| 90.0 | 59 |
| 95.0 | 43 |
| 100.0 | 31 |
| 105.0 | 22 |
| 110.0 | 18 |
| 115.0 | 16 |
| 120.0 | 16 |
| 125.0 | 16 |
| 130.0 | 16 |
| 135.0 | 17 |
| 140.0 | 17 |
| 145.0 | 17 |
| 150.0 | 17 |
| 155.0 | 18 |
| 160.0 | 18 |
| 165.0 | 17 |
| 170.0 | 16 |
| 175.0 | 14 |
| 180.0 | 16 |

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ZONAL LUMEN SUMMARY

| | |
|---------|------|
| 0- 5 | 12. |
| 5- 10 | 35. |
| 10- 15 | 58. |
| 15- 20 | 78. |
| 20- 25 | 96. |
| 25- 30 | 111. |
| 30- 35 | 122. |
| 35- 40 | 130. |
| 40- 45 | 133. |
| 45- 50 | 132. |
| 50- 55 | 127. |
| 55- 60 | 119. |
| 60- 65 | 107. |
| 65- 70 | 93. |
| 70- 75 | 78. |
| 75- 80 | 63. |
| 80- 85 | 50. |
| 85- 90 | 38. |
| 90- 95 | 28. |
| 95-100 | 20. |
| 100-105 | 14. |
| 105-110 | 10. |
| 110-115 | 9. |
| 115-120 | 8. |
| 120-125 | 7. |
| 125-130 | 7. |
| 130-135 | 7. |
| 135-140 | 6. |
| 140-145 | 6. |
| 145-150 | 5. |
| 150-155 | 4. |
| 155-160 | 4. |
| 160-165 | 3. |
| 165-170 | 2. |
| 170-175 | 1. |
| 175-180 | 0. |

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5-DEGREE ZONAL LUMEN SUMMARY

| | |
|---------|-----|
| 0- 5 | 12 |
| 5- 10 | 35 |
| 10- 15 | 58 |
| 15- 20 | 78 |
| 20- 25 | 96 |
| 25- 30 | 111 |
| 30- 35 | 122 |
| 35- 40 | 130 |
| 40- 45 | 133 |
| 45- 50 | 132 |
| 50- 55 | 127 |
| 55- 60 | 119 |
| 60- 65 | 107 |
| 65- 70 | 93 |
| 70- 75 | 78 |
| 75- 80 | 63 |
| 80- 85 | 50 |
| 85- 90 | 38 |
| 90- 95 | 28 |
| 95-100 | 20 |
| 100-105 | 14 |
| 105-110 | 10 |
| 110-115 | 9 |
| 115-120 | 8 |
| 120-125 | 7 |
| 125-130 | 7 |
| 130-135 | 7 |
| 135-140 | 6 |
| 140-145 | 6 |
| 145-150 | 5 |
| 150-155 | 4 |
| 155-160 | 4 |
| 160-165 | 3 |
| 165-170 | 2 |
| 170-175 | 1 |
| 175-180 | 0 |

10-DEGREE ZONAL LUMEN SUMMARY

| | |
|-------|------|
| 0- 10 | 47 |
| 0- 20 | 183 |
| 0- 30 | 390 |
| 0- 40 | 642 |
| 0- 50 | 908 |
| 0- 60 | 1154 |
| 0- 70 | 1354 |
| 0- 80 | 1495 |
| 0- 90 | 1583 |
| 0-100 | 1631 |
| 0-110 | 1655 |
| 0-120 | 1672 |
| 0-130 | 1686 |
| 0-140 | 1699 |
| 0-150 | 1710 |
| 0-160 | 1718 |
| 0-170 | 1723 |
| 0-180 | 1724 |

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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 | 117 | 117 | 117 | 117 | 113 | 113 | 113 | 113 | 107 | 107 | 107 | 100 | 100 | 100 | 95 | 95 | 95 | 92 |
| 1 | 105 | 100 | 95 | 91 | 102 | 97 | 92 | 88 | 91 | 87 | 84 | 86 | 83 | 80 | 81 | 78 | 76 | 73 |
| 2 | 95 | 86 | 79 | 73 | 92 | 84 | 77 | 71 | 79 | 73 | 68 | 74 | 69 | 65 | 70 | 66 | 63 | 60 |
| 3 | 86 | 75 | 67 | 60 | 83 | 73 | 65 | 59 | 69 | 62 | 57 | 65 | 59 | 55 | 61 | 57 | 53 | 50 |
| 4 | 79 | 66 | 57 | 50 | 76 | 65 | 56 | 49 | 61 | 54 | 48 | 58 | 51 | 46 | 55 | 49 | 45 | 42 |
| 5 | 72 | 59 | 50 | 43 | 70 | 58 | 49 | 42 | 54 | 47 | 41 | 52 | 45 | 40 | 49 | 43 | 39 | 36 |
| 6 | 67 | 53 | 44 | 37 | 64 | 52 | 43 | 37 | 49 | 42 | 36 | 47 | 40 | 35 | 44 | 39 | 34 | 32 |
| 7 | 62 | 48 | 39 | 33 | 60 | 47 | 38 | 32 | 45 | 37 | 32 | 42 | 36 | 31 | 40 | 35 | 30 | 28 |
| 8 | 58 | 44 | 35 | 29 | 56 | 43 | 35 | 29 | 41 | 33 | 28 | 39 | 32 | 28 | 37 | 31 | 27 | 25 |
| 9 | 54 | 40 | 32 | 26 | 52 | 39 | 31 | 26 | 37 | 30 | 25 | 36 | 29 | 25 | 34 | 28 | 24 | 22 |
| 10 | 50 | 37 | 29 | 24 | 49 | 36 | 29 | 23 | 35 | 28 | 23 | 33 | 27 | 22 | 32 | 26 | 22 | 20 |

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 LUMINAIRE SAMPLE.

REPORT NUMBER: RAB02176
DATE: 6/30/2016
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: SK16XL20RYY

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: STAMPED STEEL CEILING PAN WITH WHITE FINISH, 10 LED BOARDS EACH WITH 8 LEDS, ACRYLIC DROP LENS WITH SMOOTH FINISH.

LAMP: EIGHTY WHITE LIGHT EMITTING DIODES (LEDs), VERTICAL BASE-UP POSITION.

DRIVER: RDD-MK022-MKP45-A0700

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

| | | |
|--------------|---|------------------|
| INSTRUMENTS: | GWINSTEK PROGRAMMABLE AC POWER SOURCE APS-7100 | Calibration Due: |
| | CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202 | N/A |
| | OCEAN OPTICS QE65PRO Spectroradiometer | 2/26/17 |
| | RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry | 5/31/17 |

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.

PROCEDURE: The test sample was provided by the customer and had an unknown number of burn 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 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)

Checked X.CAO

Approved D.WANG-MUNSON
Lighting Engineer

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RESULTS:

| SPECTRORADIOMETRIC | |
|--|-------------------|
| Observer | CIE 1931 2 degree |
| Chromaticity Ordinate x | 0.4556 |
| Chromaticity Ordinate y | 0.4054 |
| Observer | CIE 1976 2 degree |
| Chromaticity Ordinate u' | 0.2621 |
| Chromaticity Ordinate v' | 0.5247 |
| Correlated Color Temp CCT (K) | 2719 |
| Color Rendering Index (CRIa) | 84 |
| Color Rendering Index 1 (Light greyish red) | 85 |
| Color Rendering Index 2 (Dark greyish yellow) | 97 |
| Color Rendering Index 3 (Strong yellowish green) | 91 |
| Color Rendering Index 4 (Moderate yellowish green) | 81 |
| Color Rendering Index 5 (Light bluish green) | 86 |
| Color Rendering Index 6 (Light blue) | 96 |
| Color Rendering Index 7 (Light violet) | 80 |
| Color Rendering Index 8 (Light reddish purple) | 60 |
| Color Rendering Index 9 (Strong red) | 20 |
| Color Rendering Index 10 (Strong yellow) | 93 |
| Color Rendering Index 11 (Strong green) | 82 |
| Color Rendering Index 12 (Strong blue) | 81 |
| Color Rendering Index 13 (Light yellowish pink (skin)) | 88 |
| Color Rendering Index 14 (Moderate olive green (leaf)) | 96 |
| ANSI C78.377-2008 Duv | -0.002 |
| Total Radiant Flux (milliWatts) | 5522 * |
| ELECTRICAL FOR SPECTRORADIOMETRIC TEST | |
| Input Voltage (Volts AC) | 120.0 |
| Input Current (Amps AC) | 0.170 |
| Input Power (Watts) | 19.9 |
| Input Power Factor (%) | 98.0 |
| Input Current THD (%) | 17.7 |
| Input Voltage THD (%) | 0.2 |
| Off-State Power (Watts) | 0.0 |

*NOTE:

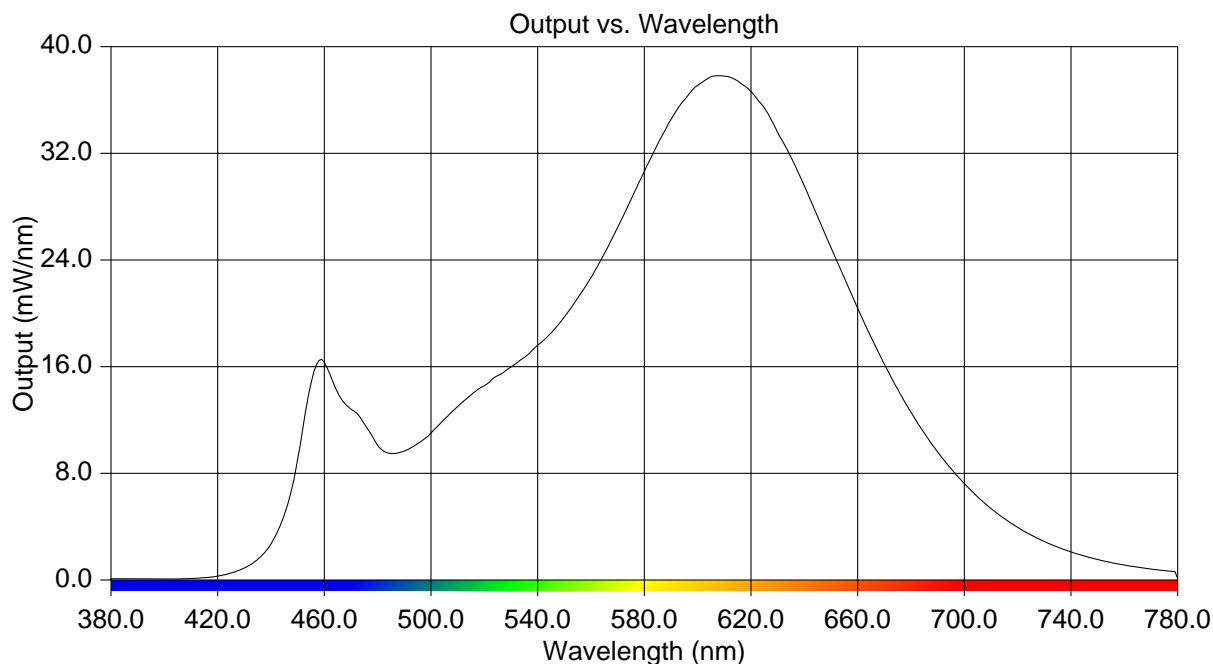
Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even 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 | 0.086 | 515 | 13.890 | 650 | 24.902 |
| 385 | 0.087 | 520 | 14.573 | 655 | 22.651 |
| 390 | 0.083 | 525 | 15.327 | 660 | 20.377 |
| 395 | 0.079 | 530 | 15.981 | 665 | 18.195 |
| 400 | 0.082 | 535 | 16.689 | 670 | 16.172 |
| 405 | 0.082 | 540 | 17.606 | 675 | 14.312 |
| 410 | 0.102 | 545 | 18.526 | 680 | 12.574 |
| 415 | 0.160 | 550 | 19.712 | 685 | 11.009 |
| 420 | 0.291 | 555 | 21.141 | 690 | 9.590 |
| 425 | 0.521 | 560 | 22.676 | 695 | 8.344 |
| 430 | 0.898 | 565 | 24.449 | 700 | 7.226 |
| 435 | 1.544 | 570 | 26.435 | 705 | 6.220 |
| 440 | 2.699 | 575 | 28.524 | 710 | 5.362 |
| 445 | 4.881 | 580 | 30.647 | 715 | 4.609 |
| 450 | 9.078 | 585 | 32.699 | 720 | 3.945 |
| 455 | 14.741 | 590 | 34.568 | 725 | 3.371 |
| 460 | 16.320 | 595 | 35.999 | 730 | 2.882 |
| 465 | 14.064 | 600 | 37.113 | 735 | 2.466 |
| 470 | 12.809 | 605 | 37.751 | 740 | 2.095 |
| 475 | 11.701 | 610 | 37.800 | 745 | 1.797 |
| 480 | 10.097 | 615 | 37.427 | 750 | 1.534 |
| 485 | 9.494 | 620 | 36.634 | 755 | 1.311 |
| 490 | 9.664 | 625 | 35.438 | 760 | 1.122 |
| 495 | 10.202 | 630 | 33.559 | 765 | 0.959 |
| 500 | 11.021 | 635 | 31.714 | 770 | 0.819 |
| 505 | 12.020 | 640 | 29.555 | 775 | 0.703 |
| 510 | 13.024 | 645 | 27.243 | 780 | 0.105 |



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CIE Chromaticity Diagram

