

REPORT NUMBER: RAB00730

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ISSUE DATE: 03/05/15

PREPARED FOR: RAB LIGHTING INC.

CATALOG NUMBER: FALCOR230YW

LUMINAIRE: ONE LUMINAIRE CONSISTING OF TWO PAIRS OF HEADS. EACH PAIR MOUNTED IN OPPOSING DIRECTIONS, EACH LIGHT HEAD CONSISTING OF: CAST FINNED METAL HOUSING, MOLDED PLASTIC REFLECTOR WITH SPECULAR FINISH, ONE CIRCUIT BOARD WITH 24 LEDS, CLEAR FLAT PRISMATIC GLASS LENS.

(SEE PAGE 2 FOR MORE INFORMATION)

CANDELA DISTRIBUTION

| | 0.0 | 22.5 | 45.0 | 67.5 | 90.0 | FLUX |
|-----|------|------|------|------|------|------|
| 0 | 7720 | 7720 | 7720 | 7720 | 7720 | |
| 5 | 7746 | 7714 | 7663 | 7642 | 7630 | 728 |
| 15 | 7386 | 7375 | 7324 | 7327 | 7327 | 2074 |
| 25 | 6906 | 6888 | 6830 | 6832 | 6858 | 3164 |
| 35 | 6182 | 6151 | 6133 | 6093 | 6087 | 3819 |
| 45 | 4813 | 4842 | 4943 | 4791 | 4728 | 3705 |
| 55 | 2832 | 2984 | 3358 | 2986 | 2829 | 2713 |
| 65 | 1163 | 1311 | 1596 | 1341 | 1197 | 1383 |
| 75 | 387 | 446 | 541 | 469 | 425 | 513 |
| 85 | 53 | 62 | 85 | 64 | 57 | 93 |
| 90 | 2 | 2 | 2 | 2 | 2 | |
| 95 | 1 | 1 | 1 | 1 | 1 | 1 |
| 105 | 1 | 1 | 1 | 2 | 1 | 1 |
| 115 | 1 | 2 | 2 | 2 | 2 | 2 |
| 125 | 2 | 2 | 2 | 3 | 3 | 2 |
| 135 | 4 | 4 | 4 | 4 | 4 | 3 |
| 145 | 5 | 5 | 5 | 5 | 6 | 3 |
| 155 | 6 | 6 | 6 | 6 | 6 | 3 |
| 165 | 6 | 6 | 6 | 6 | 6 | 2 |
| 175 | 7 | 7 | 6 | 7 | 7 | 1 |
| 180 | 7 | 7 | 7 | 7 | 7 | |

ZONAL LUMEN SUMMARY

| ZONE | LUMENS | %FIXT |
|--------|--------|-------|
| 0- 30 | 5966 | 32.8 |
| 0- 40 | 9786 | 53.7 |
| 0- 60 | 16203 | 89.0 |
| 0- 90 | 18193 | 99.9 |
| 90-120 | 5 | 0.0 |
| 90-130 | 7 | 0.0 |
| 90-150 | 13 | 0.1 |
| 90-180 | 18 | 0.1 |
| 0-180 | 18211 | 100.0 |

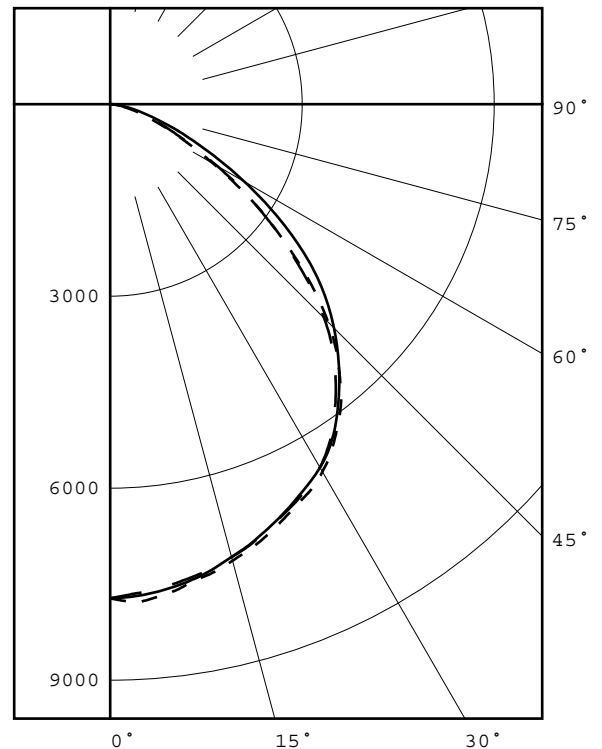
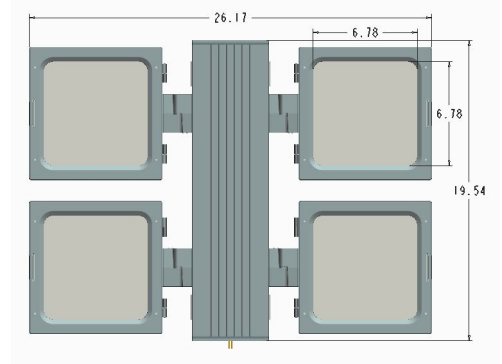
TOTAL INPUT WATTS = 242.6

EFFICACY = 75.1 Lm/W

CIE TYPE - DIRECT

PLANE : 0-DEG 90-DEG

SPACING CRITERIA : 1.3 1.3



LEGEND:

0-deg: - - - - -
45-deg: _____
90-deg: - - - - -

Checked

X.CAO

Approved

D.WANG-MUNSON

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ADDITIONAL INFORMATION

LAMP: NINTY-SIX WHITE MULTI-CHIP LIGHT EMITTING DIODES (LEDS), VERTICAL
BASE-UP POSITION.

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED.

TOTAL INPUT WATTS =242.56 AT 120.0 VAC.

LED DRIVER: RD-144-Q0700-R + RD-075-A1400

TEST PROCEDURE: IESNA LM-79-08

ACCREDITED LABORATORY CODE 201058-0

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PLANE : 0-DEG 90-DEG
BEAM ANGLE (50%) : 99.4 X 98.8 DEGREES
FIELD ANGLE (10%): 137.6 X 138.9 DEGREES

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PLANE : 0-DEG 90-DEG
LUMINOUS LENGTH :19.540 26.170

LUMINANCE DATA IN CANDELA/SQ METER

| ANGLE IN DEG | AVERAGE 0-DEG | AVERAGE 45-DEG | AVERAGE 90-DEG |
|-----------------|------------------|-------------------|-------------------|
| 45 | 20624. | 21181. | 20260. |
| 55 | 14961. | 17739. | 14945. |
| 65 | 8338. | 11443. | 8582. |
| 75 | 4531. | 6334. | 4976. |
| 85 | 1843. | 2955. | 1982. |

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CANDELA DISTRIBUTION

| | 0.0 | 22.5 | 45.0 | 67.5 | 90.0 |
|-------|------|------|------|------|------|
| 0.0 | 7720 | 7720 | 7720 | 7720 | 7720 |
| 5.0 | 7746 | 7714 | 7663 | 7642 | 7630 |
| 10.0 | 7560 | 7560 | 7534 | 7501 | 7494 |
| 15.0 | 7386 | 7375 | 7324 | 7327 | 7327 |
| 20.0 | 7167 | 7130 | 7095 | 7094 | 7104 |
| 25.0 | 6906 | 6888 | 6830 | 6832 | 6858 |
| 30.0 | 6631 | 6575 | 6557 | 6540 | 6552 |
| 35.0 | 6182 | 6151 | 6133 | 6093 | 6087 |
| 40.0 | 5586 | 5558 | 5569 | 5486 | 5474 |
| 45.0 | 4813 | 4842 | 4943 | 4791 | 4728 |
| 50.0 | 3827 | 3931 | 4233 | 3913 | 3776 |
| 55.0 | 2832 | 2984 | 3358 | 2986 | 2829 |
| 60.0 | 1869 | 2080 | 2422 | 2101 | 1918 |
| 65.0 | 1163 | 1311 | 1596 | 1341 | 1197 |
| 70.0 | 678 | 783 | 972 | 814 | 730 |
| 75.0 | 387 | 446 | 541 | 469 | 425 |
| 80.0 | 183 | 223 | 271 | 234 | 203 |
| 85.0 | 53 | 62 | 85 | 64 | 57 |
| 90.0 | 2 | 2 | 2 | 2 | 2 |
| 95.0 | 1 | 1 | 1 | 1 | 1 |
| 100.0 | 1 | 1 | 1 | 1 | 1 |
| 105.0 | 1 | 1 | 1 | 2 | 1 |
| 110.0 | 1 | 1 | 2 | 2 | 2 |
| 115.0 | 1 | 2 | 2 | 2 | 2 |
| 120.0 | 2 | 2 | 2 | 2 | 2 |
| 125.0 | 2 | 2 | 2 | 3 | 3 |
| 130.0 | 3 | 3 | 3 | 3 | 3 |
| 135.0 | 4 | 4 | 4 | 4 | 4 |
| 140.0 | 4 | 4 | 4 | 5 | 5 |
| 145.0 | 5 | 5 | 5 | 5 | 6 |
| 150.0 | 6 | 6 | 6 | 6 | 6 |
| 155.0 | 6 | 6 | 6 | 6 | 6 |
| 160.0 | 6 | 6 | 6 | 7 | 7 |
| 165.0 | 6 | 6 | 6 | 6 | 6 |
| 170.0 | 6 | 6 | 6 | 6 | 6 |
| 175.0 | 7 | 7 | 6 | 7 | 7 |
| 180.0 | 7 | 7 | 7 | 7 | 7 |

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ZONAL LUMEN SUMMARY

| | |
|---------|-------|
| 0- 5 | 184. |
| 5- 10 | 544. |
| 10- 15 | 882. |
| 15- 20 | 1192. |
| 20- 25 | 1465. |
| 25- 30 | 1699. |
| 30- 35 | 1872. |
| 35- 40 | 1947. |
| 40- 45 | 1923. |
| 45- 50 | 1782. |
| 50- 55 | 1522. |
| 55- 60 | 1191. |
| 60- 65 | 839. |
| 65- 70 | 544. |
| 70- 75 | 330. |
| 75- 80 | 184. |
| 80- 85 | 78. |
| 85- 90 | 16. |
| 90- 95 | 1. |
| 95-100 | 1. |
| 100-105 | 1. |
| 105-110 | 1. |
| 110-115 | 1. |
| 115-120 | 1. |
| 120-125 | 1. |
| 125-130 | 1. |
| 130-135 | 1. |
| 135-140 | 2. |
| 140-145 | 2. |
| 145-150 | 2. |
| 150-155 | 1. |
| 155-160 | 1. |
| 160-165 | 1. |
| 165-170 | 1. |
| 170-175 | 0. |
| 175-180 | 0. |

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5-DEGREE ZONAL LUMEN SUMMARY

| | |
|---------|------|
| 0- 5 | 184 |
| 5- 10 | 544 |
| 10- 15 | 882 |
| 15- 20 | 1192 |
| 20- 25 | 1465 |
| 25- 30 | 1699 |
| 30- 35 | 1872 |
| 35- 40 | 1947 |
| 40- 45 | 1923 |
| 45- 50 | 1782 |
| 50- 55 | 1522 |
| 55- 60 | 1191 |
| 60- 65 | 839 |
| 65- 70 | 544 |
| 70- 75 | 330 |
| 75- 80 | 184 |
| 80- 85 | 78 |
| 85- 90 | 16 |
| 90- 95 | 1 |
| 95-100 | 1 |
| 100-105 | 1 |
| 105-110 | 1 |
| 110-115 | 1 |
| 115-120 | 1 |
| 120-125 | 1 |
| 125-130 | 1 |
| 130-135 | 1 |
| 135-140 | 2 |
| 140-145 | 2 |
| 145-150 | 2 |
| 150-155 | 1 |
| 155-160 | 1 |
| 160-165 | 1 |
| 165-170 | 1 |
| 170-175 | 0 |
| 175-180 | 0 |

10-DEGREE ZONAL LUMEN SUMMARY

| | |
|-------|-------|
| 0- 10 | 728 |
| 0- 20 | 2802 |
| 0- 30 | 5966 |
| 0- 40 | 9786 |
| 0- 50 | 13490 |
| 0- 60 | 16203 |
| 0- 70 | 17586 |
| 0- 80 | 18099 |
| 0- 90 | 18193 |
| 0-100 | 18194 |
| 0-110 | 18195 |
| 0-120 | 18197 |
| 0-130 | 18199 |
| 0-140 | 18202 |
| 0-150 | 18206 |
| 0-160 | 18208 |
| 0-170 | 18210 |
| 0-180 | 18211 |

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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 | 110 | 106 | 103 | 100 | 108 | 104 | 101 | 98 | 100 | 97 | 95 | 96 | 94 | 92 | 93 | 91 | 89 | 87 |
| 2 | 102 | 95 | 89 | 84 | 99 | 93 | 87 | 83 | 89 | 85 | 81 | 86 | 82 | 79 | 83 | 80 | 77 | 75 |
| 3 | 94 | 84 | 77 | 71 | 91 | 83 | 76 | 70 | 80 | 74 | 69 | 77 | 72 | 68 | 75 | 70 | 67 | 65 |
| 4 | 86 | 75 | 67 | 61 | 84 | 74 | 67 | 61 | 72 | 65 | 60 | 69 | 64 | 59 | 67 | 62 | 58 | 56 |
| 5 | 80 | 68 | 59 | 53 | 78 | 67 | 59 | 53 | 65 | 58 | 53 | 63 | 57 | 52 | 61 | 56 | 51 | 49 |
| 6 | 74 | 61 | 53 | 47 | 72 | 60 | 53 | 47 | 59 | 52 | 46 | 57 | 51 | 46 | 55 | 50 | 46 | 44 |
| 7 | 69 | 56 | 48 | 42 | 67 | 55 | 47 | 42 | 54 | 46 | 41 | 52 | 46 | 41 | 51 | 45 | 41 | 39 |
| 8 | 64 | 51 | 43 | 37 | 62 | 50 | 43 | 37 | 49 | 42 | 37 | 48 | 42 | 37 | 47 | 41 | 37 | 35 |
| 9 | 60 | 47 | 39 | 34 | 58 | 46 | 39 | 34 | 45 | 38 | 34 | 44 | 38 | 33 | 43 | 37 | 33 | 31 |
| 10 | 56 | 43 | 36 | 31 | 55 | 43 | 36 | 31 | 42 | 35 | 31 | 41 | 35 | 30 | 40 | 34 | 30 | 29 |

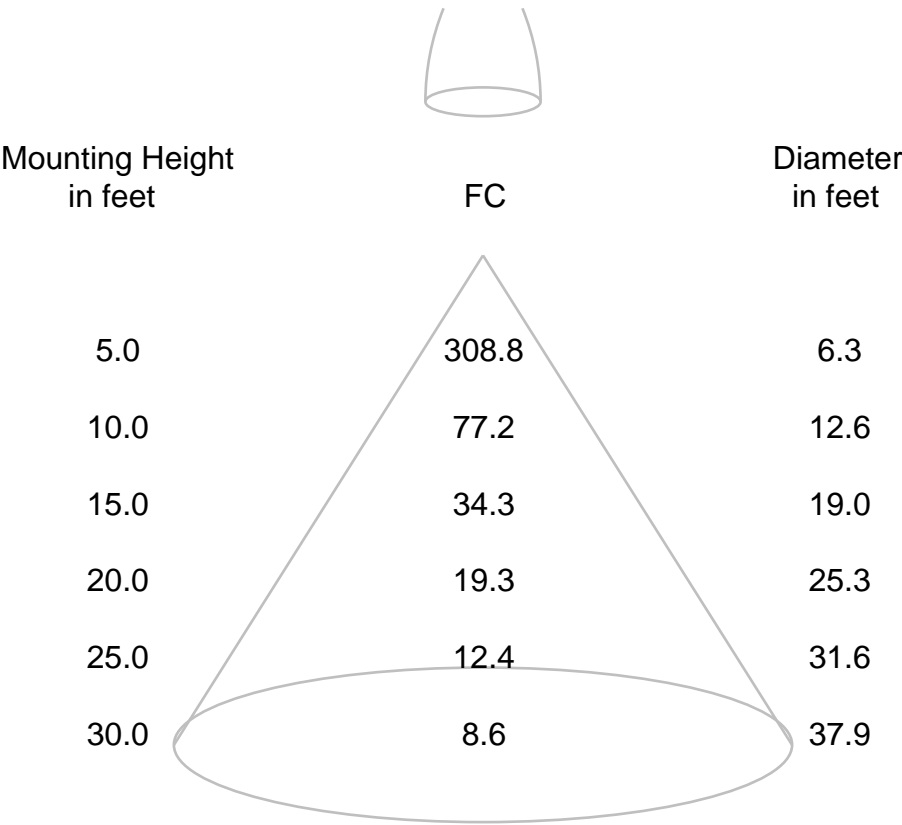
ALL CANDELA, LUMENS, LUMINANCE, AND VCP VALUES IN THIS REPORT ARE BASED ON ABSOLUTE PHOTOMETRY. THE COEFFICIENT OF UTILIZATION VALUES ARE BASED ON THE TOTAL ABSOLUTE LUMEN OUTPUT OF THIS LUMINAIRE SAMPLE.

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CONE OF LIGHT DIAGRAM

(diameter shown is where fc value is half the fc at nadir)



Note: The candela values used to generate this diagram were obtained by averaging the photometric data into a single plane.

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ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: ONE LUMINAIRE CONSISTING OF TWO PAIRS OF HEADS. EACH PAIR MOUNTED IN OPPOSING DIRECTIONS, EACH LIGHT HEAD CONSISTING OF: CAST FINNED METAL HOUSING, MOLDED PLASTIC REFLECTOR WITH SPECULAR FINISH, ONE CIRCUIT BOARD WITH 24 LEDS, CLEAR FLAT PRISMATIC GLASS LENS.

LAMP: NINTY-SIX WHITE MULTI-CHIP LIGHT EMITTING DIODES (LEDS), VERTICAL BASE-UP POSITION.

DRIVER: RD-144-Q0700-R + RD-075-A1400

OBJECT OF TEST: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT THE RATED INPUT VOLTAGES (120.0 AND 277.0 VAC, 60Hz) TO THE TEST SAMPLE.

| | | |
|--------------|---|----------------------|
| INSTRUMENTS: | CHROMA PROGRAMMABLE AC POWER SOURCE MODEL 61602 | Calibration Due: N/A |
| | CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202 | 3/14/15 |
| | OCEAN OPTICS QE65PRO Spectroradiometer | 2/5/16 |
| | RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry | 2/5/16 |

OBJECT OF TEST: Measure the Absolute Flux in lumens*, Total Radiant Flux*, Spectral Power Distribution (SPD), Correlated Color Temperature (CCT), Color Rendering Indices (CRIa,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. Measure electrical data including Total Harmonic Distortion (THD) at maximum nominal rated input voltage. Report Off-State Power.

PROCEDURE: The test sample was mounted inside the integrating sphere, energized, 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 60 input in a 25 +/-1 degree Celsius free air ambient and in accordance with IESNA LM-79-08. Electrical data was also recorded at maximum nominal rated input voltage (277.0 VAC). 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 | <u>X.CAO</u> |
| Approved | <u>D.WANG-MUNSON</u> Lighting Engineer |

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RESULTS:

| | |
|---------------------------------|-------------------|
| PHOTOMETRIC | |
| Total Integrated Flux (lumens) | 18211 * |
| SPECTRORADIOMETRIC | |
| Observer | CIE 1931 2 degree |
| Chromaticity Ordinate x | 0.4320 |
| Chromaticity Ordinate y | 0.4024 |
| Observer | CIE 1976 2 degree |
| Chromaticity Ordinate u' | 0.2481 |
| Chromaticity Ordinate v' | 0.5200 |
| Correlated Color Temp CCT (K) | 3070 |
| ANSI C78.377-2008 Duv | 0.000 |
| Total Radiant Flux (milliWatts) | 55389 * |
| ELECTRICAL | |
| Input Voltage (Volts AC) | 120.0 |
| Input Current (Amps AC) | 2.03 |
| Input Power (Watts) | 242.8 |
| Input Power Factor (%) | 99.7 |
| Input Current THD (%) | 3.9 |
| Input Voltage THD (%) | 0.2 |
| EFFICACY (Lumens/Watt) | |
| | 75.0 |
| ELECTRICAL AT MAX NONIMAL INPUT | |
| Input Voltage (Volts AC) | 277.0 |
| Input Current (Amps AC) | 0.900 |
| Input Power (Watts) | 237.7 |
| Input Power Factor (%) | 95.3 |
| Input Current THD (%) | 8.7 |
| Input Voltage THD (%) | 0.1 |
| Off-State Power (Watts) | |
| | 0.0 |

| COLOR RENDERING INDICES | CRI |
|---------------------------------|-----|
| Ra (Average 1-8) | 80 |
| R1 Light greyish red | 78 |
| R2 Dark greyish yellow | 87 |
| R3 Strong yellowish green | 94 |
| R4 Moderate yellowish green | 78 |
| R5 Light bluish green | 77 |
| R6 Light blue | 83 |
| R7 Light violet | 84 |
| R8 Light reddish purple | 60 |
| R9 Strong red | 6 |
| R10 Strong yellow | 69 |
| R11 Strong green | 74 |
| R12 Strong blue | 60 |
| R13 Light yellowish pink (skin) | 80 |
| R14 Moderate olive green (leaf) | 96 |

*NOTE:

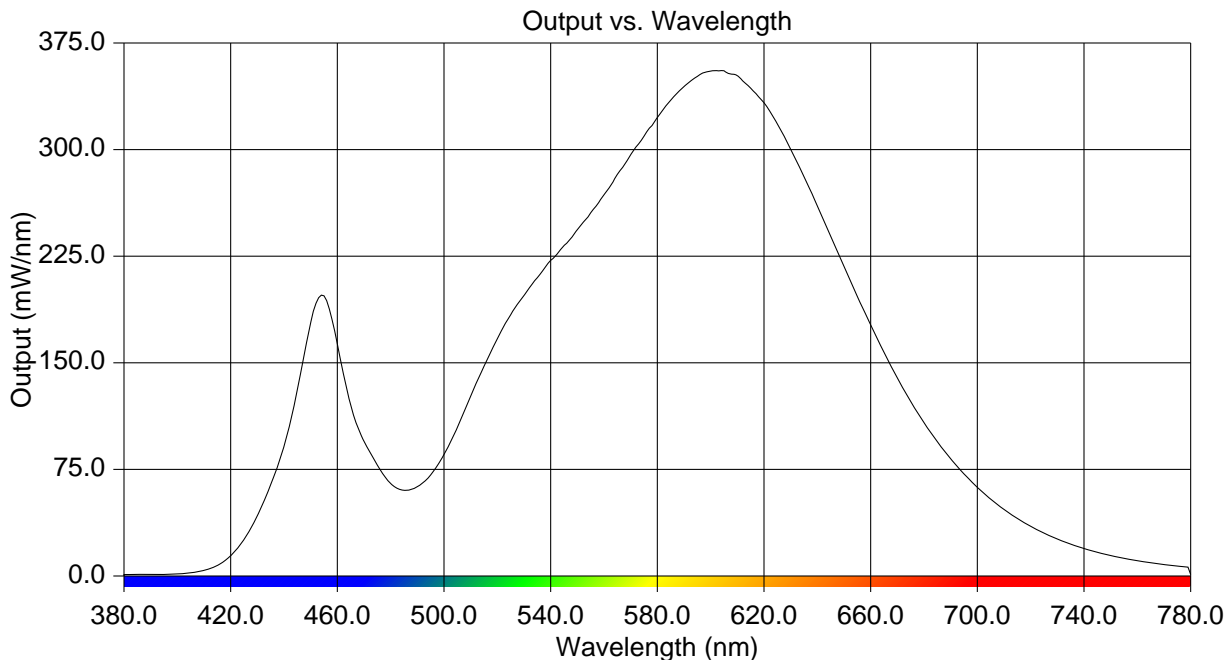
Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even 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 | 0.967 | 515 | 147.471 | 650 | 217.900 |
| 385 | 1.009 | 520 | 166.892 | 655 | 196.545 |
| 390 | 1.029 | 525 | 183.649 | 660 | 176.659 |
| 395 | 1.167 | 530 | 197.199 | 665 | 157.329 |
| 400 | 1.522 | 535 | 209.743 | 670 | 139.287 |
| 405 | 2.184 | 540 | 221.968 | 675 | 122.723 |
| 410 | 3.925 | 545 | 232.157 | 680 | 107.777 |
| 415 | 7.455 | 550 | 243.636 | 685 | 94.350 |
| 420 | 14.203 | 555 | 255.344 | 690 | 82.394 |
| 425 | 25.596 | 560 | 268.143 | 695 | 71.761 |
| 430 | 42.225 | 565 | 282.383 | 700 | 62.271 |
| 435 | 64.230 | 570 | 296.338 | 705 | 54.144 |
| 440 | 91.166 | 575 | 309.222 | 710 | 46.777 |
| 445 | 130.496 | 580 | 322.602 | 715 | 40.562 |
| 450 | 178.701 | 585 | 334.570 | 720 | 34.966 |
| 455 | 197.015 | 590 | 344.210 | 725 | 30.084 |
| 460 | 163.165 | 595 | 351.271 | 730 | 25.964 |
| 465 | 120.274 | 600 | 355.044 | 735 | 22.351 |
| 470 | 94.504 | 605 | 355.254 | 740 | 19.307 |
| 475 | 77.962 | 610 | 351.836 | 745 | 16.646 |
| 480 | 65.223 | 615 | 343.018 | 750 | 14.439 |
| 485 | 60.278 | 620 | 332.759 | 755 | 12.409 |
| 490 | 62.850 | 625 | 317.579 | 760 | 10.750 |
| 495 | 71.058 | 630 | 300.342 | 765 | 9.304 |
| 500 | 85.532 | 635 | 280.600 | 770 | 8.046 |
| 505 | 104.442 | 640 | 260.320 | 775 | 6.967 |
| 510 | 126.543 | 645 | 239.085 | 780 | 1.051 |



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CIE Chromaticity Diagram

