



LUMINAIRE TESTING LABORATORY, INC.

SUSTAINING
MEMBER
of the
IESNA

905 Harrison Street · Allentown, PA 18103 · 610-770-1044 · Fax 610-770-8912 · www.LuminaireTesting.com

LTL NUMBER: 17533 DATE: 01-12-2010
 PREPARED FOR: RENOVA LIGHTING SYSTEMS
 CATALOG NUMBER: ECS-ECO4-MN-532-UNV-12N/13N-00W
 LUMINAIRE: FORMED STEEL HOUSING, FORMED SPECULAR ALUMINUM REFLECTOR,
 NO ENCLOSURE.
 LAMP: FIVE 32 WATT T8 LINEAR FLUORESCENT LAMPS RATED AT 2850 LUMENS
 EACH.
 LAMP CATALOG NUMBER: PHILIPS F32T8/841/ALTO
 BALLAST: ONE SYLVANIA "QUICKTRONIC" QHE-3X32T8/UNV-ISN-SC AND
 ONE SYLVANIA "QUICKTRONIC" QHE-2X32T8/UNV-ISN-SC
 MOUNTING: PENDANT
 ELECTRICAL VALUES: 120.0VAC, 1.1376A, 136.4W

Candela Distribution

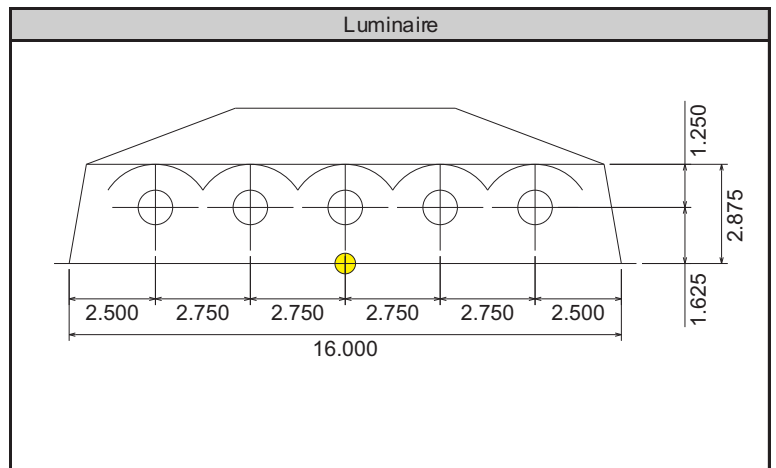
| | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 | 202.5 | 225 | 247.5 | 270 | 292.5 | 315 | 337.5 | Flux |
|-----|------|------|------|------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|--------|
| 0 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | |
| 5 | 4410 | 4435 | 4469 | 4489 | 4501 | 4489 | 4469 | 4435 | 4410 | 4435 | 4469 | 4489 | 4501 | 4489 | 4469 | 4435 | 426.8 |
| 15 | 4256 | 4366 | 4456 | 4418 | 4418 | 4418 | 4456 | 4366 | 4256 | 4366 | 4456 | 4418 | 4418 | 4418 | 4456 | 4366 | 1241.7 |
| 25 | 3956 | 4122 | 4163 | 4386 | 4514 | 4386 | 4163 | 4122 | 3956 | 4122 | 4163 | 4386 | 4514 | 4386 | 4163 | 4122 | 1946.4 |
| 35 | 3488 | 3629 | 4075 | 3602 | 3390 | 3602 | 4075 | 3629 | 3488 | 3629 | 4075 | 3602 | 3390 | 3602 | 4075 | 3629 | 2289.7 |
| 45 | 2906 | 3138 | 2809 | 2391 | 2402 | 2391 | 2809 | 3138 | 2906 | 3138 | 2809 | 2391 | 2402 | 2391 | 2809 | 3138 | 2137.6 |
| 55 | 2218 | 2518 | 1904 | 2025 | 2129 | 2025 | 1904 | 2518 | 2218 | 2518 | 1904 | 2025 | 2129 | 2025 | 1904 | 2518 | 1929.0 |
| 65 | 1474 | 1312 | 1581 | 1819 | 1923 | 1819 | 1581 | 1312 | 1474 | 1312 | 1581 | 1819 | 1923 | 1819 | 1581 | 1312 | 1596.8 |
| 75 | 710 | 810 | 1165 | 1119 | 1089 | 1119 | 1165 | 810 | 710 | 810 | 1165 | 1119 | 1089 | 1119 | 1165 | 810 | 1033.5 |
| 85 | 98 | 204 | 149 | 113 | 103 | 113 | 149 | 204 | 98 | 204 | 149 | 113 | 103 | 113 | 149 | 204 | 212.7 |
| 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 105 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 115 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 135 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 145 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 155 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 165 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 180 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

Zonal Lumen Summary

| Zone | Lumens | % of Lamp | % of Luminaire |
|--------|---------|-----------|----------------|
| 0-30 | 3614.9 | 25.4% | 28.2% |
| 0-40 | 5904.6 | 41.4% | 46.1% |
| 0-60 | 9971.2 | 70.0% | 77.8% |
| 0-90 | 12814.3 | 89.9% | 100.0% |
| 90-180 | 0.0 | 0.0% | 0.0% |
| 0-180 | 12814.3 | 89.9% | 100.0% |

Total luminaire efficiency: 89.9%

CIE Type: Direct
 Spacing Criterion: 0 deg: 1.25 90 deg: 1.29
 180 deg: 1.25 270 deg: 1.29



Approved By: _____

THIS REPORT BASED ON LM-41 AND OTHER PERTINENT IESNA PROCEDURES.



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Candela Tabulation (5 degree Vertical Increments)

| | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 | 202.5 | 225 | 247.5 | 270 | 292.5 | 315 | 337.5 |
|-----|------|------|------|------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|
| 0 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 | 4449 |
| 5 | 4410 | 4435 | 4469 | 4489 | 4501 | 4489 | 4469 | 4435 | 4410 | 4435 | 4469 | 4489 | 4501 | 4489 | 4469 | 4435 |
| 10 | 4349 | 4400 | 4512 | 4535 | 4536 | 4535 | 4512 | 4400 | 4349 | 4400 | 4512 | 4535 | 4536 | 4535 | 4512 | 4400 |
| 15 | 4256 | 4366 | 4456 | 4418 | 4418 | 4418 | 4456 | 4366 | 4256 | 4366 | 4456 | 4418 | 4418 | 4418 | 4456 | 4366 |
| 20 | 4123 | 4284 | 4291 | 4336 | 4369 | 4336 | 4291 | 4284 | 4123 | 4284 | 4291 | 4336 | 4369 | 4336 | 4291 | 4284 |
| 25 | 3956 | 4122 | 4163 | 4386 | 4514 | 4386 | 4163 | 4122 | 3956 | 4122 | 4163 | 4386 | 4514 | 4386 | 4163 | 4122 |
| 30 | 3737 | 3884 | 4100 | 4316 | 4162 | 4316 | 4100 | 3884 | 3737 | 3884 | 4100 | 4316 | 4162 | 4316 | 4100 | 3884 |
| 35 | 3488 | 3629 | 4075 | 3602 | 3390 | 3602 | 4075 | 3629 | 3488 | 3629 | 4075 | 3602 | 3390 | 3602 | 4075 | 3629 |
| 40 | 3210 | 3373 | 3520 | 2863 | 2723 | 2863 | 3520 | 3373 | 3210 | 3373 | 3520 | 2863 | 2723 | 2863 | 3520 | 3373 |
| 45 | 2906 | 3138 | 2809 | 2391 | 2402 | 2391 | 2809 | 3138 | 2906 | 3138 | 2809 | 2391 | 2402 | 2391 | 2809 | 3138 |
| 50 | 2570 | 2952 | 2206 | 2197 | 2220 | 2197 | 2206 | 2952 | 2570 | 2952 | 2206 | 2197 | 2220 | 2197 | 2206 | 2952 |
| 55 | 2218 | 2518 | 1904 | 2025 | 2129 | 2025 | 1904 | 2518 | 2218 | 2518 | 1904 | 2025 | 2129 | 2025 | 1904 | 2518 |
| 60 | 1853 | 1877 | 1685 | 1996 | 2064 | 1996 | 1685 | 1877 | 1853 | 1877 | 1685 | 1996 | 2064 | 1996 | 1685 | 1877 |
| 65 | 1474 | 1312 | 1581 | 1819 | 1923 | 1819 | 1581 | 1312 | 1474 | 1312 | 1581 | 1819 | 1923 | 1819 | 1581 | 1312 |
| 70 | 1089 | 1016 | 1397 | 1659 | 1671 | 1659 | 1397 | 1016 | 1089 | 1016 | 1397 | 1659 | 1671 | 1659 | 1397 | 1016 |
| 75 | 710 | 810 | 1165 | 1119 | 1089 | 1119 | 1165 | 810 | 710 | 810 | 1165 | 1119 | 1089 | 1119 | 1165 | 810 |
| 80 | 369 | 594 | 613 | 554 | 531 | 554 | 613 | 594 | 369 | 594 | 613 | 554 | 531 | 554 | 613 | 594 |
| 85 | 98 | 204 | 149 | 113 | 103 | 113 | 149 | 204 | 98 | 204 | 149 | 113 | 103 | 113 | 149 | 204 |
| 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 105 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 115 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 120 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 130 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 135 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 140 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 145 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 150 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 155 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 160 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 165 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 170 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 180 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Zonal Lumen Tabulation (5 degree zones)

| Zone | Lumens | Zone | Lumens | Zone | Lumens | Zone | Lumens |
|-------|--------|-------|--------|---------|--------|---------|--------|
| 0-5 | 106.5 | 45-50 | 1044.7 | 90-95 | 0.0 | 135-140 | 0.0 |
| 5-10 | 320.3 | 50-55 | 996.4 | 95-100 | 0.0 | 140-145 | 0.0 |
| 10-15 | 526.5 | 55-60 | 932.6 | 100-105 | 0.0 | 145-150 | 0.0 |
| 15-20 | 715.2 | 60-65 | 842.3 | 105-110 | 0.0 | 150-155 | 0.0 |
| 20-25 | 891.7 | 65-70 | 754.6 | 110-115 | 0.0 | 155-160 | 0.0 |
| 25-30 | 1054.6 | 70-75 | 620.2 | 115-120 | 0.0 | 160-165 | 0.0 |
| 30-35 | 1143.0 | 75-80 | 413.3 | 120-125 | 0.0 | 165-170 | 0.0 |
| 35-40 | 1146.7 | 80-85 | 182.5 | 125-130 | 0.0 | 170-175 | 0.0 |
| 40-45 | 1092.9 | 85-90 | 30.2 | 130-135 | 0.0 | 175-180 | 0.0 |



| Coefficients of Utilization - Zonal Cavity Method | | | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Effective Floor Cavity Reflectance 20% | | | | | | | | | | | | |
| Ceiling Cavity Reflectance | 90 | | | | 80 | | | | 70 | | | |
| | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 |
| Room Cavity Ratio (RCR) | | | | | | | | | | | | |
| 0 | 1.097 | 1.097 | 1.097 | 1.097 | 1.071 | 1.071 | 1.071 | 1.071 | 1.046 | 1.046 | 1.046 | 1.046 |
| 1 | 1.003 | 0.955 | 0.912 | 0.874 | 0.977 | 0.934 | 0.895 | 0.86 | 0.952 | 0.913 | 0.878 | 0.846 |
| 2 | 0.913 | 0.83 | 0.763 | 0.707 | 0.887 | 0.812 | 0.75 | 0.698 | 0.864 | 0.795 | 0.738 | 0.69 |
| 3 | 0.833 | 0.728 | 0.648 | 0.585 | 0.809 | 0.713 | 0.639 | 0.58 | 0.786 | 0.699 | 0.63 | 0.575 |
| 4 | 0.763 | 0.645 | 0.56 | 0.495 | 0.741 | 0.632 | 0.553 | 0.492 | 0.72 | 0.62 | 0.546 | 0.488 |
| 5 | 0.702 | 0.576 | 0.489 | 0.427 | 0.682 | 0.565 | 0.484 | 0.424 | 0.663 | 0.555 | 0.479 | 0.422 |
| 6 | 0.648 | 0.518 | 0.433 | 0.373 | 0.63 | 0.51 | 0.429 | 0.371 | 0.613 | 0.501 | 0.425 | 0.369 |
| 7 | 0.601 | 0.47 | 0.387 | 0.329 | 0.584 | 0.462 | 0.383 | 0.328 | 0.569 | 0.455 | 0.38 | 0.327 |
| 8 | 0.559 | 0.429 | 0.349 | 0.294 | 0.544 | 0.422 | 0.346 | 0.293 | 0.53 | 0.416 | 0.343 | 0.292 |
| 9 | 0.522 | 0.394 | 0.316 | 0.265 | 0.509 | 0.388 | 0.314 | 0.264 | 0.496 | 0.383 | 0.312 | 0.263 |
| 10 | 0.49 | 0.363 | 0.289 | 0.24 | 0.477 | 0.358 | 0.287 | 0.24 | 0.466 | 0.354 | 0.285 | 0.239 |

| Ceiling Cavity Reflectance | 50 | | | | 30 | | | 10 | | | 0 |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| Room Cavity Ratio (RCR) | | | | | | | | | | | |
| 0 | 0.999 | 0.999 | 0.999 | 0.999 | 0.957 | 0.957 | 0.957 | 0.918 | 0.918 | 0.918 | 0.899 |
| 1 | 0.907 | 0.875 | 0.846 | 0.819 | 0.84 | 0.816 | 0.794 | 0.807 | 0.788 | 0.77 | 0.751 |
| 2 | 0.82 | 0.763 | 0.715 | 0.674 | 0.734 | 0.694 | 0.658 | 0.706 | 0.673 | 0.643 | 0.624 |
| 3 | 0.745 | 0.672 | 0.613 | 0.564 | 0.647 | 0.597 | 0.555 | 0.624 | 0.581 | 0.545 | 0.525 |
| 4 | 0.682 | 0.597 | 0.533 | 0.482 | 0.576 | 0.52 | 0.475 | 0.557 | 0.508 | 0.468 | 0.449 |
| 5 | 0.628 | 0.536 | 0.469 | 0.417 | 0.518 | 0.459 | 0.412 | 0.501 | 0.45 | 0.408 | 0.389 |
| 6 | 0.581 | 0.485 | 0.417 | 0.366 | 0.469 | 0.409 | 0.363 | 0.455 | 0.401 | 0.359 | 0.341 |
| 7 | 0.54 | 0.441 | 0.374 | 0.324 | 0.428 | 0.367 | 0.322 | 0.416 | 0.361 | 0.32 | 0.302 |
| 8 | 0.504 | 0.404 | 0.338 | 0.29 | 0.393 | 0.333 | 0.289 | 0.382 | 0.328 | 0.287 | 0.27 |
| 9 | 0.472 | 0.372 | 0.307 | 0.262 | 0.363 | 0.303 | 0.261 | 0.353 | 0.299 | 0.259 | 0.243 |
| 10 | 0.444 | 0.345 | 0.282 | 0.238 | 0.336 | 0.278 | 0.237 | 0.328 | 0.275 | 0.236 | 0.22 |

Average Luminance Table (cd/m²)

| | 0 | 45 | 90 |
|----|------|------|------|
| 0 | 9148 | 9148 | 9148 |
| 45 | 8450 | 8168 | 6983 |
| 55 | 7951 | 6824 | 7632 |
| 65 | 7173 | 7693 | 9357 |
| 75 | 5644 | 9253 | 8648 |
| 85 | 2313 | 3508 | 2438 |

THIS TEST WAS CONDUCTED USING RELATIVE PHOTOMETRY TECHNIQUES ACCORDING TO STANDARD IESNA PROCEDURES. THE USER MUST THEREFORE USE CAUTION IN THE FOLLOWING SITUATIONS: 1) THIS TEST WAS PERFORMED USING A SPECIFIC BALLAST/LAMP COMBINATION. EXTRAPOLATION OF THESE DATA FOR OTHER BALLAST/LAMP COMBINATIONS MAY PRODUCE ERRONEOUS RESULTS. 2) ACCORDING TO IESNA PROCEDURES, THE BALLAST(S) AND LAMP(S) ARE PRESUMED TO PRODUCE 100% OF RATED OUTPUT. AN APPROPRIATE BALLAST FACTOR MUST BE APPLIED TO THE LUMEN OUTPUT RATINGS AND LUMINOUS INTENSITY VALUES GIVEN. 3) THIS TEST WAS CONDUCTED IN A CONTROLLED LABORATORY ENVIRONMENT WHERE THE AMBIENT TEMPERATURE WAS HELD AT 25 °C ±1°C. FIELD PERFORMANCE MAY DIFFER PARTICULARLY IN REGARDS TO CHANGE IN LUMINOUS OUTPUT AS A RESULT OF DIFFERENCE IN AMBIENT TEMPERATURE AND METHOD OF MOUNTING THE LUMINAIRE.

