



# 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: 16617 DATE: 09-17-2009  
 PREPARED FOR: RENOVA LIGHTING SYSTEMS  
 CATALOG NUMBER: ECS-RCN4-MN-232-UNV-12L-FRL  
 LUMINAIRE: FORMED WHITE ENAMEL STEEL HOUSING, FORMED SPECULAR ALUMINUM REFLECTOR, FORMED WHITE ENAMEL STEEL ENCLOSURE WITH FROSTED LINEAR PRISMATIC LENSES.  
 LAMP: TWO 32 WATT T8 LINEAR FLUORESCENT LAMPS RATED AT 2850 LUMENS EACH.  
 LAMP CATALOG NUMBER: PHILIPS F32T8/TL841/ALTO  
 BALLAST: ONE SYLVANIA "QUICKTRONIC" QHE2X32T8/UNV-ISL-SC  
 MOUNTING: RECESSED  
 ELECTRICAL VALUES: 120.0VAC, 0.4114A, 49.35W

**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   | 2267 | 2267 | 2267 | 2267 | 2267 | 2267  | 2267 | 2267  | 2267 | 2267  | 2267 | 2267  | 2267 | 2267  | 2267 | 2267  |       |
| 5   | 2257 | 2248 | 2246 | 2242 | 2240 | 2242  | 2246 | 2248  | 2257 | 2248  | 2246 | 2242  | 2240 | 2242  | 2246 | 2248  | 212.4 |
| 15  | 2129 | 2112 | 2083 | 2048 | 2033 | 2048  | 2083 | 2112  | 2129 | 2112  | 2083 | 2048  | 2033 | 2048  | 2083 | 2112  | 584.9 |
| 25  | 1886 | 1861 | 1803 | 1736 | 1712 | 1736  | 1803 | 1861  | 1886 | 1861  | 1803 | 1736  | 1712 | 1736  | 1803 | 1861  | 827.9 |
| 35  | 1555 | 1536 | 1478 | 1425 | 1410 | 1425  | 1478 | 1536  | 1555 | 1536  | 1478 | 1425  | 1410 | 1425  | 1478 | 1536  | 926.0 |
| 45  | 1177 | 1181 | 1161 | 1151 | 1151 | 1151  | 1161 | 1181  | 1177 | 1181  | 1161 | 1151  | 1151 | 1151  | 1161 | 1181  | 898.1 |
| 55  | 805  | 834  | 858  | 872  | 871  | 872   | 858  | 834   | 805  | 834   | 858  | 872   | 871  | 872   | 858  | 834   | 759.8 |
| 65  | 483  | 522  | 558  | 530  | 510  | 530   | 558  | 522   | 483  | 522   | 558  | 530   | 510  | 530   | 558  | 522   | 521.9 |
| 75  | 228  | 257  | 252  | 214  | 192  | 214   | 252  | 257   | 228  | 257   | 252  | 214   | 192  | 214   | 252  | 257   | 249.6 |
| 85  | 48   | 47   | 34   | 23   | 20   | 23    | 34   | 47    | 48   | 47    | 34   | 23    | 20   | 23    | 34   | 47    | 45.6  |
| 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     | 0     |

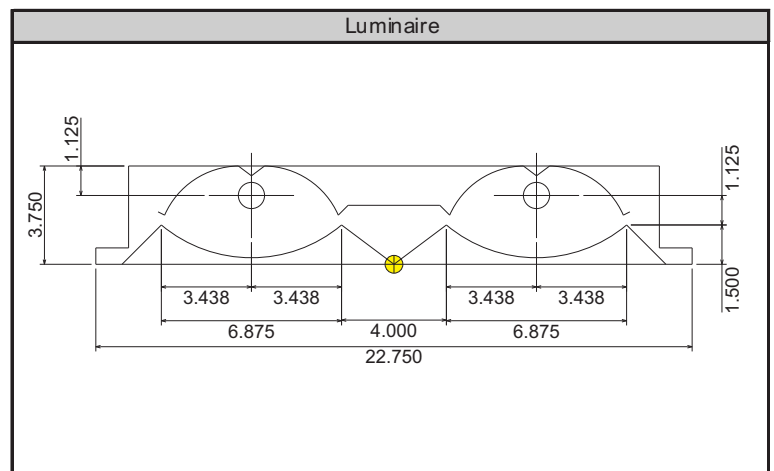
**Zonal Lumen Summary**

| Zone   | Lumens | % of Lamp | % of Luminaire |
|--------|--------|-----------|----------------|
| 0-30   | 1625.3 | 28.5%     | 32.3%          |
| 0-40   | 2551.3 | 44.8%     | 50.8%          |
| 0-60   | 4209.2 | 73.8%     | 83.7%          |
| 0-90   | 5026.3 | 88.2%     | 100.0%         |
| 90-180 | 0.0    | 0.0%      | 0.0%           |
| 0-180  | 5026.3 | 88.2%     | 100.0%         |

Total luminaire efficiency: 88.2%

CIE Type: Direct

Spacing Criterion: 0 deg: 1.15 90 deg: 1.04  
 180 deg: 1.15 270 deg: 1.04



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   | 2267 | 2267 | 2267 | 2267 | 2267 | 2267  | 2267 | 2267  | 2267 | 2267  | 2267 | 2267  | 2267 | 2267  | 2267 | 2267  |
| 5   | 2257 | 2248 | 2246 | 2242 | 2240 | 2242  | 2246 | 2248  | 2257 | 2248  | 2246 | 2242  | 2240 | 2242  | 2246 | 2248  |
| 10  | 2209 | 2197 | 2184 | 2167 | 2160 | 2167  | 2184 | 2197  | 2209 | 2197  | 2184 | 2167  | 2160 | 2167  | 2184 | 2197  |
| 15  | 2129 | 2112 | 2083 | 2048 | 2033 | 2048  | 2083 | 2112  | 2129 | 2112  | 2083 | 2048  | 2033 | 2048  | 2083 | 2112  |
| 20  | 2020 | 1999 | 1953 | 1898 | 1877 | 1898  | 1953 | 1999  | 2020 | 1999  | 1953 | 1898  | 1877 | 1898  | 1953 | 1999  |
| 25  | 1886 | 1861 | 1803 | 1736 | 1712 | 1736  | 1803 | 1861  | 1886 | 1861  | 1803 | 1736  | 1712 | 1736  | 1803 | 1861  |
| 30  | 1730 | 1704 | 1641 | 1576 | 1554 | 1576  | 1641 | 1704  | 1730 | 1704  | 1641 | 1576  | 1554 | 1576  | 1641 | 1704  |
| 35  | 1555 | 1536 | 1478 | 1425 | 1410 | 1425  | 1478 | 1536  | 1555 | 1536  | 1478 | 1425  | 1410 | 1425  | 1478 | 1536  |
| 40  | 1369 | 1359 | 1317 | 1285 | 1278 | 1285  | 1317 | 1359  | 1369 | 1359  | 1317 | 1285  | 1278 | 1285  | 1317 | 1359  |
| 45  | 1177 | 1181 | 1161 | 1151 | 1151 | 1151  | 1161 | 1181  | 1177 | 1181  | 1161 | 1151  | 1151 | 1151  | 1161 | 1181  |
| 50  | 987  | 1005 | 1008 | 1015 | 1018 | 1015  | 1008 | 1005  | 987  | 1005  | 1008 | 1015  | 1018 | 1015  | 1008 | 1005  |
| 55  | 805  | 834  | 858  | 872  | 871  | 872   | 858  | 834   | 805  | 834   | 858  | 872   | 871  | 872   | 858  | 834   |
| 60  | 636  | 673  | 707  | 715  | 697  | 715   | 707  | 673   | 636  | 673   | 707  | 715   | 697  | 715   | 707  | 673   |
| 65  | 483  | 522  | 558  | 530  | 510  | 530   | 558  | 522   | 483  | 522   | 558  | 530   | 510  | 530   | 558  | 522   |
| 70  | 346  | 383  | 396  | 363  | 341  | 363   | 396  | 383   | 346  | 383   | 396  | 363   | 341  | 363   | 396  | 383   |
| 75  | 228  | 257  | 252  | 214  | 192  | 214   | 252  | 257   | 228  | 257   | 252  | 214   | 192  | 214   | 252  | 257   |
| 80  | 127  | 140  | 128  | 97   | 84   | 97    | 128  | 140   | 127  | 140   | 128  | 97    | 84   | 97    | 128  | 140   |
| 85  | 48   | 47   | 34   | 23   | 20   | 23    | 34   | 47    | 48   | 47    | 34   | 23    | 20   | 23    | 34   | 47    |
| 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   | 54.0   | 45-50 | 438.4  | 90-95   | 0.0    | 135-140 | 0.0    |
| 5-10  | 158.4  | 50-55 | 403.7  | 95-100  | 0.0    | 140-145 | 0.0    |
| 10-15 | 252.9  | 55-60 | 356.1  | 100-105 | 0.0    | 145-150 | 0.0    |
| 15-20 | 332.0  | 60-65 | 295.1  | 105-110 | 0.0    | 150-155 | 0.0    |
| 20-25 | 392.9  | 65-70 | 226.8  | 110-115 | 0.0    | 155-160 | 0.0    |
| 25-30 | 435.0  | 70-75 | 157.0  | 115-120 | 0.0    | 160-165 | 0.0    |
| 30-35 | 459.1  | 75-80 | 92.6   | 120-125 | 0.0    | 165-170 | 0.0    |
| 35-40 | 466.9  | 80-85 | 39.6   | 125-130 | 0.0    | 170-175 | 0.0    |
| 40-45 | 459.7  | 85-90 | 6.0    | 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    |       |       |       |
| Wall Reflectance                                  | 70    | 50    | 30    | 10    | 70    | 50    | 30    | 10    | 70    | 50    | 30    | 10    |
| Room Cavity Ratio (RCR)                           |       |       |       |       |       |       |       |       |       |       |       |       |
| 0   | 1.075 | 1.075 | 1.075 | 1.075 | 1.05  | 1.05  | 1.05  | 1.05  | 1.025 | 1.025 | 1.025 | 1.025 |
| 1   | 0.993 | 0.95  | 0.913 | 0.879 | 0.968 | 0.93  | 0.895 | 0.864 | 0.944 | 0.91  | 0.879 | 0.85  |
| 2   | 0.91  | 0.836 | 0.775 | 0.725 | 0.886 | 0.819 | 0.763 | 0.716 | 0.864 | 0.802 | 0.751 | 0.708 |
| 3   | 0.835 | 0.74  | 0.667 | 0.609 | 0.813 | 0.725 | 0.658 | 0.604 | 0.791 | 0.712 | 0.649 | 0.599 |
| 4   | 0.768 | 0.659 | 0.581 | 0.521 | 0.747 | 0.647 | 0.574 | 0.518 | 0.728 | 0.636 | 0.567 | 0.514 |
| 5   | 0.709 | 0.592 | 0.512 | 0.453 | 0.69  | 0.582 | 0.506 | 0.451 | 0.672 | 0.572 | 0.501 | 0.448 |
| 6   | 0.656 | 0.535 | 0.455 | 0.399 | 0.639 | 0.527 | 0.451 | 0.397 | 0.623 | 0.518 | 0.447 | 0.395 |
| 7   | 0.61  | 0.487 | 0.409 | 0.355 | 0.594 | 0.48  | 0.405 | 0.353 | 0.579 | 0.473 | 0.402 | 0.352 |
| 8   | 0.569 | 0.446 | 0.37  | 0.318 | 0.554 | 0.439 | 0.367 | 0.317 | 0.541 | 0.433 | 0.364 | 0.316 |
| 9   | 0.532 | 0.41  | 0.337 | 0.288 | 0.519 | 0.405 | 0.335 | 0.287 | 0.507 | 0.4   | 0.333 | 0.287 |
| 10  | 0.499 | 0.379 | 0.309 | 0.263 | 0.488 | 0.375 | 0.307 | 0.262 | 0.477 | 0.37  | 0.305 | 0.262 |

| Ceiling Cavity Reflectance | 50    |       |       |       | 30    |       |       | 10    |       |       | 0     |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Wall Reflectance           | 70    | 50    | 30    | 10    | 50    | 30    | 10    | 50    | 30    | 10    | 0     |
| Room Cavity Ratio (RCR)    |       |       |       |       |       |       |       |       |       |       |       |
| 0                          | 0.98  | 0.98  | 0.98  | 0.98  | 0.938 | 0.938 | 0.938 | 0.9   | 0.9   | 0.9   | 0.882 |
| 1                          | 0.901 | 0.873 | 0.847 | 0.823 | 0.838 | 0.818 | 0.798 | 0.807 | 0.79  | 0.775 | 0.757 |
| 2                          | 0.822 | 0.772 | 0.728 | 0.691 | 0.743 | 0.707 | 0.676 | 0.717 | 0.687 | 0.661 | 0.642 |
| 3                          | 0.752 | 0.686 | 0.632 | 0.588 | 0.662 | 0.616 | 0.578 | 0.64  | 0.601 | 0.568 | 0.55  |
| 4                          | 0.691 | 0.614 | 0.554 | 0.507 | 0.594 | 0.542 | 0.501 | 0.575 | 0.531 | 0.494 | 0.476 |
| 5                          | 0.639 | 0.554 | 0.491 | 0.443 | 0.537 | 0.482 | 0.439 | 0.521 | 0.473 | 0.434 | 0.416 |
| 6                          | 0.592 | 0.503 | 0.439 | 0.392 | 0.488 | 0.432 | 0.388 | 0.474 | 0.424 | 0.385 | 0.368 |
| 7                          | 0.552 | 0.459 | 0.396 | 0.35  | 0.447 | 0.39  | 0.347 | 0.435 | 0.384 | 0.345 | 0.328 |
| 8                          | 0.516 | 0.422 | 0.359 | 0.315 | 0.411 | 0.354 | 0.313 | 0.401 | 0.349 | 0.311 | 0.295 |
| 9                          | 0.484 | 0.39  | 0.328 | 0.285 | 0.38  | 0.324 | 0.284 | 0.372 | 0.32  | 0.282 | 0.267 |
| 10                         | 0.456 | 0.362 | 0.302 | 0.26  | 0.354 | 0.298 | 0.259 | 0.346 | 0.295 | 0.258 | 0.243 |

Average Luminance Table (cd/m<sup>2</sup>)

|    | 0    | 45   | 90   |
|----|------|------|------|
| 0  | 3532 | 3532 | 3532 |
| 45 | 2593 | 2557 | 2535 |
| 55 | 2187 | 2329 | 2366 |
| 65 | 1779 | 2057 | 1881 |
| 75 | 1373 | 1515 | 1158 |
| 85 | 857  | 611  | 356  |

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.

