

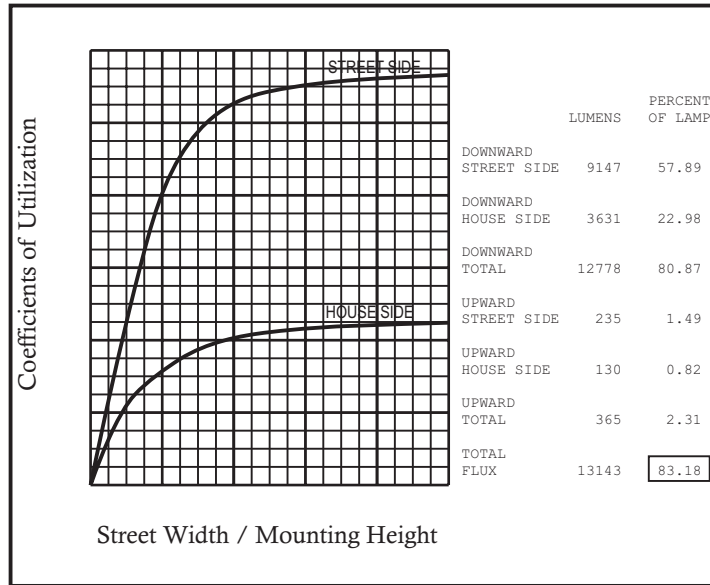
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Coefficients of Utilization and Flux Distribution



The coefficients of utilization and flux distribution section of the roadway report are designed to indicate the percentage of flux falling on both the street and the house sides of the luminaire.

This section depicts the flux in both upward and downward directions as well as street side and house side. The total flux is the summation of the upward and downward flux for both house and street sides. The percent of lamp is obtained by dividing the total flux by the rated lumens of the lamp.

Ex. Total Flux=13143
Rated Lamp Lumens=15800

$$13143/15800=83.18\%$$

Isofootcandle Lines of Horizontal Illumination

The isofootcandle lines of horizontal illumination plot is a graphical representation of a luminaire mounted at a specified height above a surface. Points of equal illuminance are connected by a continuous line for varying illuminance levels. The surface is defined in terms of longitudinal and transverse lines measured in increments of mounting heights. By using mounting heights as coordinates, the user has the ability to adjust the diagram for various different mounting heights other than the original for which the diagram was created.

The luminaire is located at the coordinate 0,0. The 0 degree lateral plane is situated along the 0 degree longitudinal line and the 90 degree lateral plane is situated along the 0 degree transverse line.

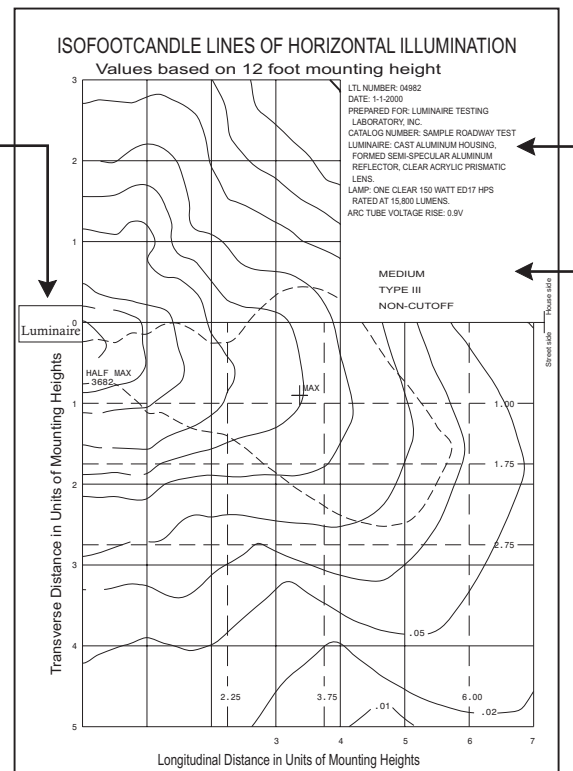
The maximum candela point is indicated on the plot by using a plus sign. The location of the max point is used to determine the distribution classification. (Short, medium, long).

- Short** Max falls between 0 and 2.25 longitudinal roadway line
- Medium** Max falls between 2.25 and 3.75 longitudinal roadway line
- Long** Max falls beyond the 3.75 longitudinal roadway line

The trace that indicates one half of the maximum candela value is represented by a dashed line. This trace is used to determine the luminaire type classification. (I, II, III, IV)

- Type I** Half Max trace falls before the 1.0 transverse roadway line
- Type II** Half Max trace falls between 1.0 and 1.75 transverse roadway line
- Type III** Half Max trace falls between 1.75 and 2.75 transverse roadway line
- Type IV** Half Max trace falls beyond the 2.75 transverse roadway line

This section gives a description of the luminaire as it was tested in the laboratory. It also includes the test number, date, manufacturer, as well as the lamp description, lumens, and any other pertinent information to the testing of the luminaire. Below the section you will find a summary of the luminaire's distribution, type, and cutoff classification as defined by the IES.

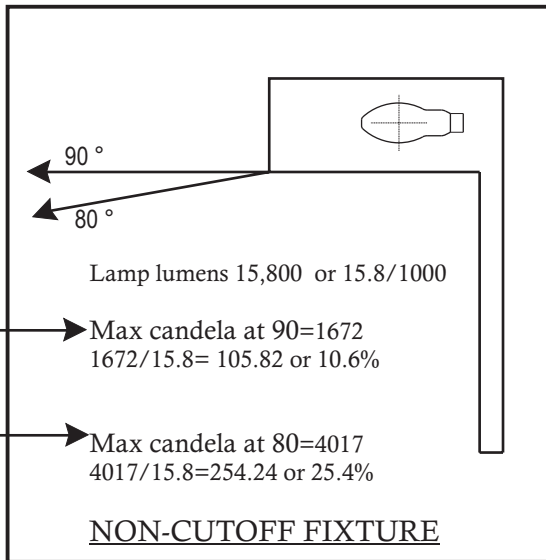


*The Half Max trace must be measured within the zone (Short, Medium, Long) in which the maximum is located. In the example diagram, the Half Max trace is measured only in the area between the 2.25 and 3.75 (Medium) longitudinal roadway line.

Full Cutoff/Cutoff/Semi-Cutoff/Non-Cutoff

The proportion of candela output distributed at 80 and 90 degrees will classify the luminaire as either full cutoff, cutoff, semi-cutoff, or non-cutoff. These candela values can be obtained from the street/house side candela tabulation pages.

| STREET SIDE CANDELA TABULATION | | | | | | | | | | | | | HOUSE SIDE CANDELA TABULATION | | | | | | | | | | | | |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--|--|--|
| LATERAL ANGLE | | | | | | | | | | | | | LATERAL ANGLE | | | | | | | | | | | | |
| | 0.0 | 5.0 | 15.0 | 25.0 | 35.0 | 45.0 | 55.0 | 65.0 | 75.0 | 85.0 | 90.0 | | 95.0 | 105.0 | 115.0 | 125.0 | 135.0 | 145.0 | 155.0 | 165.0 | 175.0 | 180.0 | | | |
| 180.0 | 0.0 | 0.0 | 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 | 0.0 | 0.0 | | | |
| 175.0 | 0.0 | 0.0 | 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 | 0.0 | 0.0 | | | |
| 165.0 | 0.0 | 0.0 | 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 | 0.0 | 0.0 | | | |
| 155.0 | 0.0 | 0.0 | 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 | 0.0 | 0.0 | | | |
| 145.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 3.0 | 5.0 | 3.0 | 7.0 | 9.0 | 145.0 | 10.0 | 10.0 | 10.0 | 9.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| 135.0 | 17.0 | 12.0 | 11.0 | 8.0 | 10.0 | 10.0 | 12.0 | 17.0 | 14.0 | 17.0 | 17.0 | 135.0 | 17.0 | 15.0 | 12.0 | 10.0 | 8.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| 125.0 | 28.0 | 23.0 | 25.0 | 25.0 | 24.0 | 25.0 | 26.0 | 34.0 | 37.0 | 36.0 | 34.0 | 125.0 | 32.0 | 25.0 | 21.0 | 17.0 | 12.0 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| 115.0 | 48.0 | 43.0 | 45.0 | 46.0 | 50.0 | 52.0 | 52.0 | 54.0 | 69.0 | 56.0 | 50.0 | 115.0 | 47.0 | 43.0 | 43.0 | 39.0 | 34.0 | 21.0 | 6.0 | 0.0 | 0.0 | 0.0 | | | |
| 105.0 | 96.0 | 87.0 | 85.0 | 90.0 | 95.0 | 98.0 | 113.0 | 103.0 | 114.0 | 93.0 | 78.0 | 105.0 | 74.0 | 69.0 | 67.0 | 74.0 | 81.0 | 59.0 | 46.0 | 26.0 | 5.0 | 0.0 | | | |
| 95.0 | 160.0 | 154.0 | 173.0 | 169.0 | 167.0 | 181.0 | 256.0 | 361.0 | 556.0 | 282.0 | 186.0 | 95.0 | 140.0 | 114.0 | 126.0 | 175.0 | 178.0 | 187.0 | 160.0 | 114.0 | 99.0 | 90.0 | | | |
| 90.0 | 209.0 | 198.0 | 186.0 | 191.0 | 220.0 | 233.0 | 386.0 | 868.0 | 1672.0 | 766.0 | 369.0 | 90.0 | 212.0 | 147.0 | 143.0 | 198.0 | 206.0 | 196.0 | 198.0 | 183.0 | 169.0 | 162.0 | | | |
| 87.5 | 247.0 | 230.0 | 228.0 | 250.0 | 253.0 | 270.0 | 569.0 | 995.0 | 1846.0 | 907.0 | 449.0 | 87.5 | 263.0 | 173.0 | 159.0 | 193.0 | 222.0 | 209.0 | 213.0 | 208.0 | 195.0 | 186.0 | | | |
| 85.0 | 295.0 | 271.0 | 262.0 | 271.0 | 266.0 | 318.0 | 993.0 | 1182.0 | 1887.0 | 1068.0 | 589.0 | 85.0 | 381.0 | 248.0 | 206.0 | 209.0 | 246.0 | 248.0 | 243.0 | 233.0 | 217.0 | 212.0 | | | |
| V 82.5 | 415.0 | 337.0 | 281.0 | 314.0 | 334.0 | 379.0 | 1970.0 | 1980.0 | 2326.0 | 1344.0 | 800.0 | V 82.5 | 583.0 | 382.0 | 272.0 | 242.0 | 272.0 | 310.0 | 277.0 | 271.0 | 245.0 | 247.0 | | | |
| E 80.0 | 556.0 | 423.0 | 379.0 | 580.0 | 441.0 | 481.0 | 2660.0 | 3741.0 | 4017.0 | 2040.0 | 1403.0 | E 80.0 | 1167.0 | 752.0 | 341.0 | 301.0 | 290.0 | 377.0 | 366.0 | 325.0 | 294.0 | 286.0 | | | |
| R 77.5 | 601.0 | 512.0 | 461.0 | 682.0 | 652.0 | 681.0 | 2516.0 | 5477.0 | 6320.0 | 3992.0 | 3358.0 | R 77.5 | 2883.0 | 1125.0 | 448.0 | 412.0 | 327.0 | 498.0 | 502.0 | 422.0 | 385.0 | 349.0 | | | |
| T 75.0 | 553.0 | 549.0 | 542.0 | 863.0 | 811.0 | 947.0 | 2558.0 | 6135.0 | 7276.0 | 5645.0 | 4998.0 | T 75.0 | 4011.0 | 1492.0 | 738.0 | 518.0 | 427.0 | 712.0 | 720.0 | 552.0 | 513.0 | 462.0 | | | |
| I 74.0 | 560.0 | 571.0 | 576.0 | 884.0 | 812.0 | 1088.0 | 2660.0 | 5851.0 | 7364.0 | 6043.0 | 5413.0 | I 74.0 | 4311.0 | 1603.0 | 864.0 | 551.0 | 480.0 | 817.0 | 816.0 | 608.0 | 562.0 | 516.0 | | | |
| C 72.5 | 611.0 | 619.0 | 616.0 | 834.0 | 749.0 | 1259.0 | 2949.0 | 5328.0 | 7245.0 | 6217.0 | 5569.0 | C 72.5 | 4369.0 | 1676.0 | 971.0 | 595.0 | 570.0 | 970.0 | 950.0 | 679.0 | 633.0 | 580.0 | | | |
| A 70.0 | 926.0 | 854.0 | 781.0 | 942.0 | 810.0 | 1452.0 | 3108.0 | 4653.0 | 5874.0 | 4925.0 | 4319.0 | A 70.0 | 3327.0 | 1512.0 | 1067.0 | 650.0 | 765.0 | 1229.0 | 1158.0 | 761.0 | 737.0 | 676.0 | | | |
| L 67.5 | 830.0 | 926.0 | 920.0 | 1205.0 | 1087.0 | 1945.0 | 3582.0 | 4935.0 | 5320.0 | 3697.0 | 3128.0 | L 67.5 | 2467.0 | 1543.0 | 1250.0 | 704.0 | 991.0 | 1511.0 | 1336.0 | 796.0 | 792.0 | 768.0 | | | |
| 65.0 | 820.0 | 869.0 | 999.0 | 1630.0 | 1780.0 | 2642.0 | 4099.0 | 5674.0 | 5259.0 | 3220.0 | 2631.0 | 65.0 | 2216.0 | 1578.0 | 1339.0 | 748.0 | 1206.0 | 1667.0 | 1397.0 | 823.0 | 800.0 | 792.0 | | | |
| A 62.5 | 1258.0 | 1227.0 | 1359.0 | 2014.0 | 2789.0 | 2903.0 | 4376.0 | 5980.0 | 5144.0 | 3224.0 | 2850.0 | A 62.5 | 2623.0 | 1882.0 | 1339.0 | 784.0 | 1396.0 | 1667.0 | 1352.0 | 860.0 | 803.0 | 796.0 | | | |
| N 60.0 | 1646.0 | 1653.0 | 1781.0 | 2211.0 | 3136.0 | 3237.0 | 4372.0 | 5694.0 | 5112.0 | 3614.0 | 3450.0 | N 60.0 | 3373.0 | 2375.0 | 1327.0 | 875.0 | 1640.0 | 1691.0 | 1310.0 | 901.0 | 830.0 | 823.0 | | | |
| G 55.0 | 1748.0 | 1803.0 | 2158.0 | 2379.0 | 2857.0 | 4044.0 | 4779.0 | 5113.0 | 4589.0 | 3627.0 | 3724.0 | G 55.0 | 3773.0 | 2481.0 | 1165.0 | 1090.0 | 2056.0 | 1823.0 | 1227.0 | 992.0 | 971.0 | 951.0 | | | |
| L 45.0 | 2582.0 | 2653.0 | 2773.0 | 2843.0 | 3485.0 | 4449.0 | 4892.0 | 4542.0 | 3810.0 | 3423.0 | 3476.0 | L 45.0 | 3083.0 | 1715.0 | 893.0 | 1087.0 | 1145.0 | 993.0 | 933.0 | 998.0 | 1026.0 | 1042.0 | | | |
| E 35.0 | 3995.0 | 3918.0 | 3980.0 | 4240.0 | 4530.0 | 4674.0 | 4501.0 | 3880.0 | 3566.0 | 3507.0 | 3556.0 | E 35.0 | 3203.0 | 1933.0 | 990.0 | 663.0 | 657.0 | 715.0 | 762.0 | 771.0 | 780.0 | | | | |
| 25.0 | 4001.0 | 3994.0 | 4090.0 | 4061.0 | 4064.0 | 3936.0 | 3649.0 | 3426.0 | 3441.0 | 3470.0 | 3347.0 | 25.0 | 3036.0 | 2171.0 | 1472.0 | 1029.0 | 665.0 | 587.0 | 584.0 | 595.0 | 833.0 | 1002.0 | | | |
| 15.0 | 3718.0 | 3744.0 | 3739.0 | 3764.0 | 3764.0 | 3796.0 | 3845.0 | 3730.0 | 3349.0 | 2805.0 | 2634.0 | 15.0 | 2483.0 | 2176.0 | 1925.0 | 1684.0 | 1471.0 | 1288.0 | 1149.0 | 1035.0 | 1056.0 | 1055.0 | | | |
| 5.0 | 3689.0 | 3721.0 | 3738.0 | 3727.0 | 3669.0 | 3630.0 | 3571.0 | 3500.0 | 3433.0 | 3293.0 | 3220.0 | 5.0 | 3140.0 | 2985.0 | 2830.0 | 2672.0 | 2515.0 | 2384.0 | 2290.0 | 2217.0 | 2172.0 | 2136.0 | | | |
| 0.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 0.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | | | |



Full Cutoff-

A luminaire can be classified as full cutoff when there is no light at or above 90 degrees and the candela per 1000 lamp lumens does not exceed 10 (1%) at or above 80 degrees.

Cutoff-

A luminaire can be classified as cutoff when the candela per 1000 lamp lumens does not exceed 25 (2.5%) at or above 90 degrees and 100 (10%) at or above 80 degrees.

Semi-Cutoff-

A luminaire can be classified as semi-cutoff when the candela per 1000 lamp lumens does not exceed 50 (5%) at or above 90 degrees and 200 (20%) at or above 80 degrees.

Non-Cutoff-

A luminaire with more than 20% of the maximum candela at or above 80 degrees would be classified as non-cutoff.

Candela Tabulation

| STREET SIDE CANDELA TABULATION | | | | | | | | | | | |
|--------------------------------|---------------|--------|--------|--------|--------|--------|--------|--------|---------------|--------|--------|
| | LATERAL ANGLE | | | | | | | | | | |
| | 0.0 | 5.0 | 15.0 | 25.0 | 35.0 | 45.0 | 55.0 | 65.0 | 75.0 | 85.0 | 90.0 |
| 180.0 | 0.0 | 0.0 | 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 | 0.0 | 0.0 | 0.0 |
| 165.0 | 0.0 | 0.0 | 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 | 0.0 | 0.0 | 0.0 |
| 145.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 3.0 | 5.0 | 7.0 | 9.0 |
| 135.0 | 17.0 | 12.0 | 11.0 | 8.0 | 10.0 | 10.0 | 12.0 | 17.0 | 14.0 | 17.0 | 17.0 |
| 125.0 | 28.0 | 23.0 | 25.0 | 25.0 | 24.0 | 25.0 | 26.0 | 34.0 | 37.0 | 36.0 | 34.0 |
| 115.0 | 48.0 | 43.0 | 45.0 | 46.0 | 50.0 | 52.0 | 52.0 | 54.0 | 69.0 | 56.0 | 50.0 |
| 105.0 | 96.0 | 87.0 | 85.0 | 90.0 | 95.0 | 98.0 | 113.0 | 103.0 | 114.0 | 93.0 | 78.0 |
| 95.0 | 160.0 | 154.0 | 173.0 | 169.0 | 167.0 | 181.0 | 256.0 | 361.0 | 556.0 | 282.0 | 186.0 |
| 90.0 | 209.0 | 198.0 | 186.0 | 191.0 | 220.0 | 233.0 | 386.0 | 868.0 | 1672.0 | 766.0 | 369.0 |
| 87.5 | 247.0 | 230.0 | 228.0 | 250.0 | 253.0 | 270.0 | 569.0 | 995.0 | 1846.0 | 907.0 | 449.0 |
| 85.0 | 295.0 | 271.0 | 262.0 | 271.0 | 266.0 | 318.0 | 993.0 | 1182.0 | 1887.0 | 1068.0 | 589.0 |
| V 82.5 | 415.0 | 337.0 | 281.0 | 314.0 | 334.0 | 379.0 | 1970.0 | 1980.0 | 2326.0 | 1344.0 | 800.0 |
| E 80.0 | 556.0 | 423.0 | 379.0 | 580.0 | 441.0 | 481.0 | 2660.0 | 3741.0 | 4017.0 | 2040.0 | 1403.0 |
| R 77.5 | 601.0 | 512.0 | 461.0 | 682.0 | 652.0 | 681.0 | 2516.0 | 5477.0 | 6320.0 | 3992.0 | 3358.0 |
| T 75.0 | 553.0 | 549.0 | 542.0 | 863.0 | 811.0 | 947.0 | 2558.0 | 6135.0 | <u>7276.0</u> | 5645.0 | 4998.0 |
| I 74.0 | 560.0 | 571.0 | 576.0 | 884.0 | 812.0 | 1088.0 | 2660.0 | 5851.0 | <u>7364.0</u> | 6043.0 | 5413.0 |
| C 72.5 | 611.0 | 619.0 | 616.0 | 934.0 | 749.0 | 1259.0 | 2949.0 | 5328.0 | 7245.0 | 6217.0 | 5569.0 |
| A 70.0 | 926.0 | 854.0 | 781.0 | 942.0 | 810.0 | 1452.0 | 3108.0 | 4653.0 | 5874.0 | 4925.0 | 4319.0 |
| L 67.5 | 830.0 | 926.0 | 920.0 | 1205.0 | 1087.0 | 1945.0 | 3582.0 | 4935.0 | 5320.0 | 3697.0 | 3128.0 |
| 65.0 | 820.0 | 869.0 | 999.0 | 1630.0 | 1780.0 | 2642.0 | 4099.0 | 5674.0 | 5259.0 | 3220.0 | 2631.0 |
| A 62.5 | 1258.0 | 1227.0 | 1359.0 | 2014.0 | 2789.0 | 2903.0 | 4376.0 | 5980.0 | 5144.0 | 3224.0 | 2850.0 |
| N 60.0 | 1646.0 | 1653.0 | 1781.0 | 2211.0 | 3136.0 | 3237.0 | 4372.0 | 5694.0 | 5112.0 | 3614.0 | 3450.0 |
| G 55.0 | 1748.0 | 1803.0 | 2158.0 | 2379.0 | 2857.0 | 4044.0 | 4779.0 | 5113.0 | 4589.0 | 3627.0 | 3724.0 |
| L 45.0 | 2582.0 | 2653.0 | 2773.0 | 2843.0 | 3485.0 | 4449.0 | 4892.0 | 4542.0 | 3810.0 | 3423.0 | 3476.0 |
| E 35.0 | 3995.0 | 3918.0 | 3980.0 | 4240.0 | 4530.0 | 4674.0 | 4501.0 | 3880.0 | 3566.0 | 3507.0 | 3556.0 |
| 25.0 | 4001.0 | 3994.0 | 4090.0 | 4061.0 | 4064.0 | 3936.0 | 3649.0 | 3426.0 | 3441.0 | 3470.0 | 3347.0 |
| 15.0 | 3718.0 | 3744.0 | 3739.0 | 3764.0 | 3764.0 | 3796.0 | 3845.0 | 3730.0 | 3349.0 | 2805.0 | 2634.0 |
| 5.0 | 3689.0 | 3721.0 | 3738.0 | 3727.0 | 3669.0 | 3630.0 | 3571.0 | 3500.0 | 3433.0 | 3293.0 | 3220.0 |
| 0.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 | 3032.0 |

This section represents the candela values at given vertical and lateral angles. The lateral angles 0 through 90 represent the street side, followed by the 90 to 180 representing the house side. The vertical angle that contains the maximum candela value is underlined for easier reference. In the example to the left, the maximum candela value can be found at 74 degrees vertical.

Maximum Candela Value

Maximum Plane and Cone Plots of Candela

This diagram actually shows two plots. The first plot (left hand side) represents the vertical plane through the maximum candela, the second plot (right hand side) is the cone through the maximum candela.

The **vertical plane through the maximum candela** represents the candela values at the respective vertical angles from nadir through zenith at the lateral angle at which the maximum candela occurs.

The **cone through maximum candela** is a polar plot representation of the candela values through the lateral planes at the vertical angle where the maximum occurs.

The luminaire sketch is used to pictorially explain any information that the description does not explain. This includes critical dimensions of the luminaire, lamp positioning, and orientation during testing. A directional arrow (or occasionally a circled plus sign) indicates the photometric center of the luminaire as tested.

