

## 1.3 MP Lens Charts

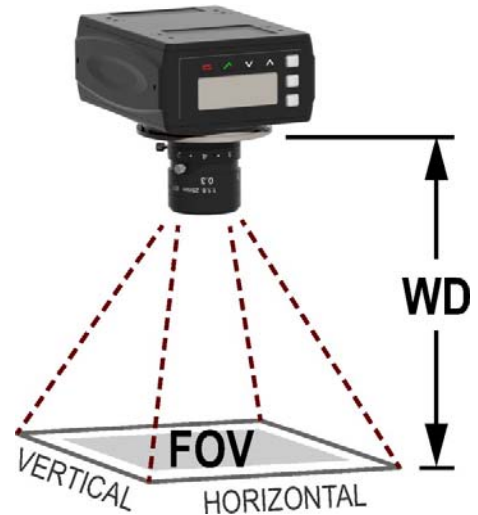
This paper offers information useful for selecting a C-mount lens for the VE Series 1.3 MP smart camera. Other documents are available for the WVGA and 2 MP models.

### Working Distance and Field of View

The two main variables involved when discussing a camera's lens choice are the **Working Distance** and the **Field of View** size. The Working Distance, or WD, is the distance from the camera to the target object. In the case of this collection of lens charts, the Working Distance is measured from the front surface of the threaded lens cover mount. The distance is not measured from the end of the lens because different lenses from different manufacturers, even with the same focal length, can vary in length.

The Field of View, or FOV, is the real world size of the picture the camera takes. This can also be broken down into a horizontal FOV size and a vertical FOV size. Note that the picture taken by a VE Series vision sensor is not square. The imager used in the 1.3 MP VE sensor is 1280 × 1024 pixels, making a rectangular image where the vertical FOV is 80% the size of the horizontal FOV.

The Working Distance and Field of View sizes are related by linear equations determined by the focal length of the lens. Choosing the correct lens for a given application might be a matter of selecting the desired size of the FOV, then seeing which of the options for focal length result in a good fit for camera Working Distance. The situation might also be reversed, where the desired mounting location of the camera is known (and thus the Working Distance is fixed) and the various focal length lenses give a range of FOV sizes to choose from. In all cases, only one of these two variables may be freely selected. The second variable then becomes a function of the first. This is the reason why we offer a broad range of lens focal lengths—to provide as many options as possible to suit different WD/FOV size requirements.



### Multiple Manufacturers and Format Size

Banner does not manufacture any C-mount lenses used by our vision sensors. Instead we offer a range of lenses from different suppliers. Any C-mount lens will technically work in a VE Series vision sensor, but some lenses are better suited than others. Banner recommends using at least 2/3-inch format, or “megapixel”-rated, lenses. A lens of at least this format size ensures that the entire VE Series imager chip is used when taking pictures. These lenses are also better at resolving small features in the picture, allowing an inspection to make better use of the camera's resolution.

The lens charts which follow are divided into groups based on lens manufacturer.

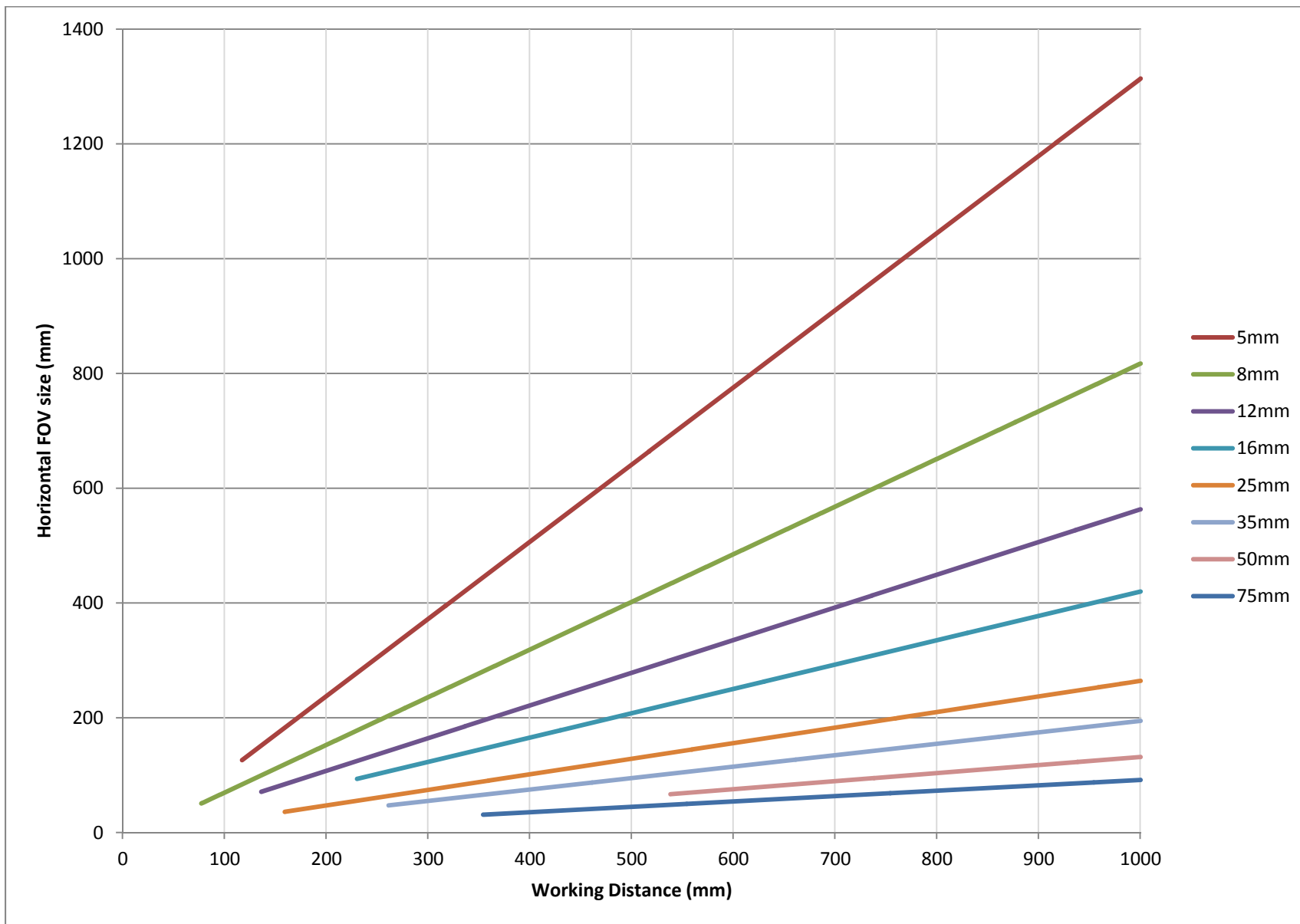
**Imager Resolution:** 1280 px (H) × 1024 px (W)  
**Pixel Size:** 5.3 μm × 5.3 μm  
**Image Size:** 6.9 mm (H) × 5.5 mm (W), 8.7 mm (diagonal)

### Off the Charts

In the pages that follow, graphical views of the Working Distance versus Horizontal FOV relationships are shown, out to a maximum working distance of 1 meter. These graphs offer a quick and easy way to estimate the FOV size for a given Working Distance and lens focal length. Also provided are two tables with entries out to 1.5 meters. The first shows FOV size as a function of Working Distance and the second shows Working Distance as a function of FOV size. The mathematical equations that describe the relationship between these two variables are also provided, allowing for calculations beyond what the chart and tables offer.

Each lens has a natural minimum Working Distance. If a camera using this lens were to move closer to the target than this minimum distance, the image would be out of focus and the lens alone would not be able to fix it. This is where extension tubes and shims are used. Extension tubes allow a lens to come into focus at a Working Distance closer than the minimum. The relationship between Working Distance and FOV size remains in effect as extension tubes are added, and so extension tubes are usually used to generate very small FOVs. A microscope is basically a high focal length lens with a large amount of extension tubes applied.

### Computar C-mount Lenses on 1.3 MP VE Series



Computar C-mount Lenses on 1.3 MP VE Series, FOV as a function of WD Chart

| WD (mm) | FOV (mm)            |                   |                    |                    |                    |                    |                    |                    |
|---------|---------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|         | 5mm                 | 8mm               | 12mm               | 16mm               | 25mm               | 35mm               | 50mm               | 75mm               |
| Minimum | 123 x 98<br>@ 117mm | 52 x 42<br>@ 77mm | 71 x 57<br>@ 136mm | 93 x 74<br>@ 230mm | 36 x 29<br>@ 159mm | 47 x 38<br>@ 261mm | 68 x 54<br>@ 538mm | 31 x 25<br>@ 354mm |
| 20      |                     |                   |                    |                    |                    |                    |                    |                    |
| 40      |                     |                   |                    |                    |                    |                    |                    |                    |
| 60      |                     |                   |                    |                    |                    |                    |                    |                    |
| 80      |                     | 53 x 43           |                    |                    |                    |                    |                    |                    |
| 100     |                     | 70 x 56           |                    |                    |                    |                    |                    |                    |
| 120     | 130 x 104           | 86 x 69           |                    |                    |                    |                    |                    |                    |
| 140     | 157 x 126           | 103 x 82          | 73 x 59            |                    |                    |                    |                    |                    |
| 160     | 184 x 147           | 120 x 96          | 85 x 68            |                    | 36 x 29            |                    |                    |                    |
| 180     | 211 x 169           | 136 x 109         | 96 x 77            |                    | 42 x 33            |                    |                    |                    |
| 200     | 238 x 190           | 153 x 122         | 108 x 86           |                    | 47 x 38            |                    |                    |                    |
| 220     | 265 x 212           | 169 x 136         | 119 x 95           |                    | 53 x 42            |                    |                    |                    |
| 240     | 292 x 233           | 186 x 149         | 130 x 104          | 98 x 78            | 58 x 46            |                    |                    |                    |
| 260     | 319 x 255           | 203 x 162         | 142 x 113          | 106 x 85           | 63 x 51            |                    |                    |                    |
| 280     | 345 x 276           | 219 x 175         | 153 x 122          | 115 x 92           | 69 x 55            | 51 x 41            |                    |                    |
| 300     | 372 x 298           | 236 x 189         | 164 x 132          | 123 x 98           | 74 x 59            | 55 x 44            |                    |                    |
| 320     | 399 x 319           | 252 x 202         | 176 x 141          | 132 x 105          | 80 x 64            | 59 x 47            |                    |                    |
| 340     | 426 x 341           | 269 x 215         | 187 x 150          | 140 x 112          | 85 x 68            | 63 x 50            |                    |                    |
| 360     | 453 x 362           | 286 x 229         | 199 x 159          | 149 x 119          | 91 x 72            | 67 x 54            |                    | 32 x 25            |
| 380     | 480 x 384           | 302 x 242         | 210 x 168          | 157 x 126          | 96 x 77            | 71 x 57            |                    | 33 x 27            |
| 400     | 507 x 405           | 319 x 255         | 221 x 177          | 165 x 132          | 101 x 81           | 75 x 60            |                    | 35 x 28            |
| 420     | 534 x 427           | 336 x 268         | 233 x 186          | 174 x 139          | 107 x 86           | 79 x 63            |                    | 37 x 30            |
| 440     | 561 x 448           | 352 x 282         | 244 x 195          | 182 x 146          | 112 x 90           | 83 x 66            |                    | 39 x 31            |
| 460     | 588 x 470           | 369 x 295         | 256 x 205          | 191 x 153          | 118 x 94           | 87 x 70            |                    | 41 x 33            |
| 480     | 614 x 492           | 385 x 308         | 267 x 214          | 199 x 160          | 123 x 99           | 91 x 73            |                    | 43 x 34            |
| 500     | 641 x 513           | 402 x 322         | 278 x 223          | 208 x 166          | 129 x 103          | 95 x 76            |                    | 45 x 36            |
| 520     | 668 x 535           | 419 x 335         | 290 x 232          | 216 x 173          | 134 x 107          | 99 x 79            |                    | 47 x 37            |
| 540     | 695 x 556           | 435 x 348         | 301 x 241          | 225 x 180          | 139 x 112          | 103 x 82           | 67 x 54            | 48 x 39            |
| 560     | 722 x 578           | 452 x 361         | 313 x 250          | 233 x 187          | 145 x 116          | 107 x 85           | 70 x 56            | 50 x 40            |
| 580     | 749 x 599           | 468 x 375         | 324 x 259          | 242 x 193          | 150 x 120          | 111 x 89           | 73 x 58            | 52 x 42            |
| 600     | 776 x 621           | 485 x 388         | 335 x 268          | 250 x 200          | 156 x 125          | 115 x 92           | 76 x 60            | 54 x 43            |
| 620     | 803 x 642           | 502 x 401         | 347 x 277          | 259 x 207          | 161 x 129          | 119 x 95           | 78 x 63            | 56 x 45            |
| 640     | 830 x 664           | 518 x 415         | 358 x 287          | 267 x 214          | 167 x 133          | 123 x 98           | 81 x 65            | 58 x 46            |
| 660     | 856 x 685           | 535 x 428         | 370 x 296          | 276 x 221          | 172 x 138          | 127 x 101          | 84 x 67            | 60 x 48            |
| 680     | 883 x 707           | 552 x 441         | 381 x 305          | 284 x 227          | 177 x 142          | 131 x 105          | 87 x 69            | 62 x 49            |
| 700     | 910 x 728           | 568 x 454         | 392 x 314          | 293 x 234          | 183 x 146          | 135 x 108          | 90 x 72            | 63 x 51            |
| 720     | 937 x 750           | 585 x 468         | 404 x 323          | 301 x 241          | 188 x 151          | 139 x 111          | 92 x 74            | 65 x 52            |
| 740     | 964 x 771           | 601 x 481         | 415 x 332          | 310 x 248          | 194 x 155          | 143 x 114          | 95 x 76            | 67 x 54            |
| 760     | 991 x 793           | 618 x 494         | 427 x 341          | 318 x 255          | 199 x 159          | 147 x 117          | 98 x 78            | 69 x 55            |
| 780     | 1018 x 814          | 635 x 508         | 438 x 350          | 327 x 261          | 205 x 164          | 151 x 121          | 101 x 81           | 71 x 57            |
| 800     | 1045 x 836          | 651 x 521         | 449 x 359          | 335 x 268          | 210 x 168          | 155 x 124          | 104 x 83           | 73 x 58            |
| 820     | 1072 x 857          | 668 x 534         | 461 x 369          | 344 x 275          | 215 x 172          | 159 x 127          | 106 x 85           | 75 x 60            |
| 840     | 1099 x 879          | 684 x 548         | 472 x 378          | 352 x 282          | 221 x 177          | 163 x 130          | 109 x 87           | 77 x 61            |
| 860     | 1125 x 900          | 701 x 561         | 484 x 387          | 361 x 288          | 226 x 181          | 167 x 133          | 112 x 90           | 78 x 63            |
| 880     | 1152 x 922          | 718 x 574         | 495 x 396          | 369 x 295          | 232 x 185          | 171 x 137          | 115 x 92           | 80 x 64            |
| 900     | 1179 x 943          | 734 x 587         | 506 x 405          | 378 x 302          | 237 x 190          | 175 x 140          | 118 x 94           | 82 x 66            |
| 920     | 1206 x 965          | 751 x 601         | 518 x 414          | 386 x 309          | 243 x 194          | 179 x 143          | 120 x 96           | 84 x 67            |
| 940     | 1233 x 986          | 767 x 614         | 529 x 423          | 395 x 316          | 248 x 198          | 183 x 146          | 123 x 99           | 86 x 69            |
| 960     | 1260 x 1008         | 784 x 627         | 540 x 432          | 403 x 322          | 253 x 203          | 187 x 149          | 126 x 101          | 88 x 70            |
| 980     | 1287 x 1029         | 801 x 641         | 552 x 442          | 411 x 329          | 259 x 207          | 191 x 152          | 129 x 103          | 90 x 72            |
| 1000    | 1314 x 1051         | 817 x 654         | 563 x 451          | 420 x 336          | 264 x 211          | 195 x 156          | 132 x 105          | 92 x 73            |
| 1020    | 1341 x 1073         | 834 x 667         | 575 x 460          | 428 x 343          | 270 x 216          | 199 x 159          | 134 x 108          | 93 x 75            |
| 1040    | 1368 x 1094         | 851 x 680         | 586 x 469          | 437 x 350          | 275 x 220          | 203 x 162          | 137 x 110          | 95 x 76            |
| 1060    | 1394 x 1116         | 867 x 694         | 597 x 478          | 445 x 356          | 281 x 224          | 207 x 165          | 140 x 112          | 97 x 78            |
| 1080    | 1421 x 1137         | 884 x 707         | 609 x 487          | 454 x 363          | 286 x 229          | 210 x 168          | 143 x 114          | 99 x 79            |
| 1100    | 1448 x 1159         | 900 x 720         | 620 x 496          | 462 x 370          | 291 x 233          | 214 x 172          | 146 x 117          | 101 x 81           |
| 1120    | 1475 x 1180         | 917 x 734         | 632 x 505          | 471 x 377          | 297 x 238          | 218 x 175          | 148 x 119          | 103 x 82           |
| 1140    | 1502 x 1202         | 934 x 747         | 643 x 514          | 479 x 383          | 302 x 242          | 222 x 178          | 151 x 121          | 105 x 84           |
| 1160    | 1529 x 1223         | 950 x 760         | 654 x 524          | 488 x 390          | 308 x 246          | 226 x 181          | 154 x 123          | 107 x 85           |
| 1180    | 1556 x 1245         | 967 x 773         | 666 x 533          | 496 x 397          | 313 x 251          | 230 x 184          | 157 x 126          | 108 x 87           |
| 1200    | 1583 x 1266         | 983 x 787         | 677 x 542          | 505 x 404          | 319 x 255          | 234 x 188          | 160 x 128          | 110 x 88           |
| 1220    | 1610 x 1288         | 1000 x 800        | 689 x 551          | 513 x 411          | 324 x 259          | 238 x 191          | 162 x 130          | 112 x 90           |
| 1240    | 1637 x 1309         | 1017 x 813        | 700 x 560          | 522 x 417          | 329 x 264          | 242 x 194          | 165 x 132          | 114 x 91           |
| 1260    | 1663 x 1331         | 1033 x 827        | 711 x 569          | 530 x 424          | 335 x 268          | 246 x 197          | 168 x 134          | 116 x 93           |
| 1280    | 1690 x 1352         | 1050 x 840        | 723 x 578          | 539 x 431          | 340 x 272          | 250 x 200          | 171 x 137          | 118 x 94           |
| 1300    | 1717 x 1374         | 1066 x 853        | 734 x 587          | 547 x 438          | 346 x 277          | 254 x 203          | 174 x 139          | 120 x 96           |
| 1320    | 1744 x 1395         | 1083 x 866        | 746 x 596          | 556 x 445          | 351 x 281          | 258 x 207          | 177 x 141          | 122 x 97           |
| 1340    | 1771 x 1417         | 1100 x 880        | 757 x 606          | 564 x 451          | 357 x 285          | 262 x 210          | 179 x 143          | 123 x 99           |
| 1360    | 1798 x 1438         | 1116 x 893        | 768 x 615          | 573 x 458          | 362 x 290          | 266 x 213          | 182 x 146          | 125 x 100          |
| 1380    | 1825 x 1460         | 1133 x 906        | 780 x 624          | 581 x 465          | 367 x 294          | 270 x 216          | 185 x 148          | 127 x 102          |
| 1400    | 1852 x 1481         | 1150 x 920        | 791 x 633          | 590 x 472          | 373 x 298          | 274 x 219          | 188 x 150          | 129 x 103          |
| 1420    | 1879 x 1503         | 1166 x 933        | 803 x 642          | 598 x 478          | 378 x 303          | 278 x 223          | 191 x 152          | 131 x 105          |
| 1440    | 1906 x 1524         | 1183 x 946        | 814 x 651          | 607 x 485          | 384 x 307          | 282 x 226          | 193 x 155          | 133 x 106          |
| 1460    | 1932 x 1546         | 1199 x 959        | 825 x 660          | 615 x 492          | 389 x 311          | 286 x 229          | 196 x 157          | 135 x 108          |
| 1480    | 1959 x 1567         | 1216 x 973        | 837 x 669          | 624 x 499          | 395 x 316          | 290 x 232          | 199 x 159          | 137 x 109          |
| 1500    | 1986 x 1589         | 1233 x 986        | 848 x 679          | 632 x 506          | 400 x 320          | 294 x 235          | 202 x 161          | 138 x 111          |

Computar C-mount Lenses on 1.3 MP VE Series, WD as a function of FOV Chart

| FOV (mm)    |      | WD (mm)             |                   |                    |                    |                    |                    |                    |                    |  |
|-------------|------|---------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|
|             |      | 5mm                 | 8mm               | 12mm               | 16mm               | 25mm               | 35mm               | 50mm               | 75mm               |  |
|             |      | 123 x 98<br>@ 117mm | 52 x 42<br>@ 77mm | 71 x 57<br>@ 136mm | 93 x 74<br>@ 230mm | 36 x 29<br>@ 159mm | 47 x 38<br>@ 261mm | 68 x 54<br>@ 538mm | 31 x 25<br>@ 357mm |  |
| 20 x 15     |      |                     |                   |                    |                    |                    |                    |                    |                    |  |
| 40 x 30     |      |                     |                   |                    | 173                |                    |                    |                    | 450                |  |
| 60 x 45     |      |                     | 88                |                    | 247                | 325                |                    |                    | 663                |  |
| 80 x 60     |      |                     | 112               | 152                | 321                | 425                | 632                |                    | 877                |  |
| 100 x 75    |      |                     | 136               | 187                | 246                | 395                | 526                | 775                | 1090               |  |
| 120 x 90    |      |                     | 160               | 222                | 293                | 468                | 626                | 917                | 1303               |  |
| 140 x 105   | 127  |                     | 185               | 257                | 340                | 542                | 726                | 1060               | 1517               |  |
| 160 x 120   | 142  |                     | 209               | 292                | 387                | 616                | 827                | 1202               | 1730               |  |
| 180 x 135   | 157  |                     | 233               | 327                | 434                | 689                | 927                | 1345               | 1944               |  |
| 200 x 150   | 172  |                     | 257               | 362                | 481                | 763                | 1027               | 1487               | 2157               |  |
| 220 x 165   | 187  |                     | 281               | 397                | 529                | 837                | 1128               | 1630               | 2371               |  |
| 240 x 180   | 202  |                     | 305               | 433                | 576                | 910                | 1228               | 1772               | 2584               |  |
| 260 x 195   | 216  |                     | 329               | 468                | 623                | 984                | 1328               | 1915               | 2798               |  |
| 280 x 210   | 231  |                     | 353               | 503                | 670                | 1058               | 1429               | 2058               | 3011               |  |
| 300 x 225   | 246  |                     | 377               | 538                | 717                | 1131               | 1529               | 2200               | 3224               |  |
| 320 x 240   | 261  |                     | 401               | 573                | 764                | 1205               | 1629               | 2343               | 3438               |  |
| 340 x 255   | 276  |                     | 425               | 608                | 811                | 1279               | 1730               | 2485               | 3651               |  |
| 360 x 270   | 291  |                     | 449               | 643                | 859                | 1353               | 1830               | 2628               | 3865               |  |
| 380 x 285   | 306  |                     | 474               | 678                | 906                | 1426               | 1931               | 2770               | 4078               |  |
| 400 x 300   | 321  |                     | 498               | 713                | 953                | 1500               | 2031               | 2913               | 4292               |  |
| 420 x 315   | 335  |                     | 522               | 748                | 1000               | 1574               | 2131               | 3055               | 4505               |  |
| 440 x 330   | 350  |                     | 546               | 784                | 1047               | 1647               | 2232               | 3198               | 4719               |  |
| 460 x 345   | 365  |                     | 570               | 819                | 1094               | 1721               | 2332               | 3341               | 4932               |  |
| 480 x 360   | 380  |                     | 594               | 854                | 1142               | 1795               | 2432               | 3483               | 5145               |  |
| 500 x 375   | 395  |                     | 618               | 889                | 1189               | 1868               | 2533               | 3626               | 5359               |  |
| 520 x 390   | 410  |                     | 642               | 924                | 1236               | 1942               | 2633               | 3768               | 5572               |  |
| 540 x 405   | 425  |                     | 666               | 959                | 1283               | 2016               | 2733               | 3911               | 5786               |  |
| 560 x 420   | 440  |                     | 690               | 994                | 1330               | 2089               | 2834               | 4053               | 5999               |  |
| 580 x 435   | 454  |                     | 714               | 1029               | 1377               | 2163               | 2934               | 4196               | 6213               |  |
| 600 x 450   | 469  |                     | 738               | 1064               | 1425               | 2237               | 3034               | 4338               | 6426               |  |
| 620 x 465   | 484  |                     | 762               | 1100               | 1472               | 2311               | 3135               | 4481               | 6640               |  |
| 640 x 480   | 499  |                     | 787               | 1135               | 1519               | 2384               | 3235               | 4623               | 6853               |  |
| 660 x 495   | 514  |                     | 811               | 1170               | 1566               | 2458               | 3335               | 4766               | 7066               |  |
| 680 x 510   | 529  |                     | 835               | 1205               | 1613               | 2532               | 3436               | 4909               | 7280               |  |
| 700 x 525   | 544  |                     | 859               | 1240               | 1660               | 2605               | 3536               | 5051               | 7493               |  |
| 720 x 540   | 559  |                     | 883               | 1275               | 1708               | 2679               | 3637               | 5194               | 7707               |  |
| 740 x 555   | 573  |                     | 907               | 1310               | 1755               | 2753               | 3737               | 5336               | 7920               |  |
| 760 x 570   | 588  |                     | 931               | 1345               | 1802               | 2826               | 3837               | 5479               | 8134               |  |
| 780 x 585   | 603  |                     | 955               | 1380               | 1849               | 2900               | 3938               | 5621               | 8347               |  |
| 800 x 600   | 618  |                     | 979               | 1416               | 1896               | 2974               | 4038               | 5764               | 8561               |  |
| 820 x 615   | 633  |                     | 1003              | 1451               | 1943               | 3047               | 4138               | 5906               | 8774               |  |
| 840 x 630   | 648  |                     | 1027              | 1486               | 1990               | 3121               | 4239               | 6049               | 8988               |  |
| 860 x 645   | 663  |                     | 1051              | 1521               | 2038               | 3195               | 4339               | 6192               | 9201               |  |
| 880 x 660   | 677  |                     | 1075              | 1556               | 2085               | 3269               | 4439               | 6334               | 9414               |  |
| 900 x 675   | 692  |                     | 1100              | 1591               | 2132               | 3342               | 4540               | 6477               | 9628               |  |
| 920 x 690   | 707  |                     | 1124              | 1626               | 2179               | 3416               | 4640               | 6619               | 9841               |  |
| 940 x 705   | 722  |                     | 1148              | 1661               | 2226               | 3490               | 4740               | 6762               | 10055              |  |
| 960 x 720   | 737  |                     | 1172              | 1696               | 2273               | 3563               | 4841               | 6904               | 10268              |  |
| 980 x 735   | 752  |                     | 1196              | 1731               | 2321               | 3637               | 4941               | 7047               | 10482              |  |
| 1000 x 750  | 767  |                     | 1220              | 1767               | 2368               | 3711               | 5041               | 7189               | 10695              |  |
| 1020 x 765  | 782  |                     | 1244              | 1802               | 2415               | 3784               | 5142               | 7332               | 10909              |  |
| 1040 x 780  | 796  |                     | 1268              | 1837               | 2462               | 3858               | 5242               | 7475               | 11122              |  |
| 1060 x 795  | 811  |                     | 1292              | 1872               | 2509               | 3932               | 5342               | 7617               | 11335              |  |
| 1080 x 810  | 826  |                     | 1316              | 1907               | 2556               | 4005               | 5443               | 7760               | 11549              |  |
| 1100 x 825  | 841  |                     | 1340              | 1942               | 2604               | 4079               | 5543               | 7902               | 11762              |  |
| 1120 x 840  | 856  |                     | 1364              | 1977               | 2651               | 4153               | 5644               | 8045               | 11976              |  |
| 1140 x 855  | 871  |                     | 1389              | 2012               | 2698               | 4227               | 5744               | 8187               | 12189              |  |
| 1160 x 870  | 886  |                     | 1413              | 2047               | 2745               | 4300               | 5844               | 8330               | 12403              |  |
| 1180 x 885  | 901  |                     | 1437              | 2083               | 2792               | 4374               | 5945               | 8472               | 12616              |  |
| 1200 x 900  | 915  |                     | 1461              | 2118               | 2839               | 4448               | 6045               | 8615               | 12830              |  |
| 1220 x 915  | 930  |                     | 1485              | 2153               | 2886               | 4521               | 6145               | 8757               | 13043              |  |
| 1240 x 930  | 945  |                     | 1509              | 2188               | 2934               | 4595               | 6246               | 8900               | 13256              |  |
| 1260 x 945  | 960  |                     | 1533              | 2223               | 2981               | 4669               | 6346               | 9043               | 13470              |  |
| 1280 x 960  | 975  |                     | 1557              | 2258               | 3028               | 4742               | 6446               | 9185               | 13683              |  |
| 1300 x 975  | 990  |                     | 1581              | 2293               | 3075               | 4816               | 6547               | 9328               | 13897              |  |
| 1320 x 990  | 1005 |                     | 1605              | 2328               | 3122               | 4890               | 6647               | 9470               | 14110              |  |
| 1340 x 1005 | 1020 |                     | 1629              | 2363               | 3169               | 4963               | 6747               | 9613               | 14324              |  |
| 1360 x 1020 | 1034 |                     | 1653              | 2398               | 3217               | 5037               | 6848               | 9755               | 14537              |  |
| 1380 x 1035 | 1049 |                     | 1677              | 2434               | 3264               | 5111               | 6948               | 9898               | 14751              |  |
| 1400 x 1050 | 1064 |                     | 1702              | 2469               | 3311               | 5185               | 7048               | 10040              | 14964              |  |
| 1420 x 1065 | 1079 |                     | 1726              | 2504               | 3358               | 5258               | 7149               | 10183              | 15177              |  |
| 1440 x 1080 | 1094 |                     | 1750              | 2539               | 3405               | 5332               | 7249               | 10326              | 15391              |  |
| 1460 x 1095 | 1109 |                     | 1774              | 2574               | 3452               | 5406               | 7350               | 10468              | 15604              |  |
| 1480 x 1110 | 1124 |                     | 1798              | 2609               | 3500               | 5479               | 7450               | 10611              | 15818              |  |
| 1500 x 1125 | 1138 |                     | 1822              | 2644               | 3547               | 5553               | 7550               | 10753              | 16031              |  |

## Computar Lens equations for VE Series 1.3 MP

H = horizontal FOV size, W = working distance



### 5 mm Megapixel lens

**Banner model:** LCF05LCMP (p/n 11381)

**Computar model:** H0514-MP

1/2-inch format, 43 mm filter, minimum f/1.4

***H(W), mm***

$H = 1.34 \times W - 31.15$  (minimum W ~ 117 mm)

***W(H), mm***

$W = (H + 31.15)/1.34$  (minimum H ~ 123 mm)



### 8 mm Megapixel lens

**Banner model:** LCF08LMP (p/n 74300)

**Computar model:** M0814-MP2

2/3-inch format, 30.5 mm filter, minimum f/1.4

***H(W), mm***

$H = 0.83 \times W - 13.31$  (minimum W ~ 77 mm)

***W(H), mm***

$W = (H + 13.31)/0.83$  (minimum H ~ 52 mm)



### 12 mm Megapixel lens

**Banner model:** LCF12LMP (p/n 74299)

**Computar model:** M1214-MP2

2/3-inch format, 30.5 mm filter, minimum f/1.4

***H(W), mm***

$H = 0.57 \times W - 6.42$  (minimum W ~ 136 mm)

***W(H), mm***

$W = (H + 6.42)/0.57$  (minimum H ~ 71 mm)



### 16 mm Megapixel lens

**Banner model:** LCF16LCMP (p/n 11382)

**Computar model:** M1614-MP2

2/3-inch format, 30.5 mm filter, minimum f/1.4

***H(W), mm***

$H = 0.424 \times W - 4.15$  (minimum W ~ 230 mm)

***W(H), mm***

$W = (H + 4.15)/0.424$  (minimum H ~ 93 mm)



### 25 mm Megapixel lens

**Banner model:** LCF25LCMP (p/n 11383)

**Computar model:** M2514-MP2

2/3-inch format, 30.5 mm filter, minimum f/1.4

***H(W), mm***

$H = 0.27 \times W - 7.08$  (minimum  $W \sim 159$ mm)

***W(H), mm***

$W = (H + 7.08)/0.27$  (minimum  $H \sim 36$ mm)



### 35 mm Megapixel lens

**Banner model:** LCF35LCMP (p/n 11384)

**Computar model:** M3514-MP

2/3-inch format, 30.5 mm filter, minimum f/1.4

***H(W), mm***

$H = 0.199 \times W - 4.76$  (minimum  $W \sim 261$  mm)

***W(H), mm***

$W = (H + 4.76)/0.199$  (minimum  $H \sim 47$  mm)



### 50 mm Megapixel lens

**Banner model:** LCF50LCMP (p/n 11385)

**Computar model:** M5018-MP2

2/3-inch format, 30.5 mm filter, minimum f/1.8

***H(W), mm***

$H = 0.14 \times W - 8.67$  (minimum  $W \sim 538$  mm)

***W(H), mm***

$W = (H + 8.67)/0.14$  (minimum  $H \sim 68$  mm)



### 75 mm Megapixel lens

**Banner model:** LCF75LCMP (p/n 11386)

**Computar model:** M7528-MP

2/3-inch format, 30.5 mm filter, minimum f/2.8

***H(W), mm***

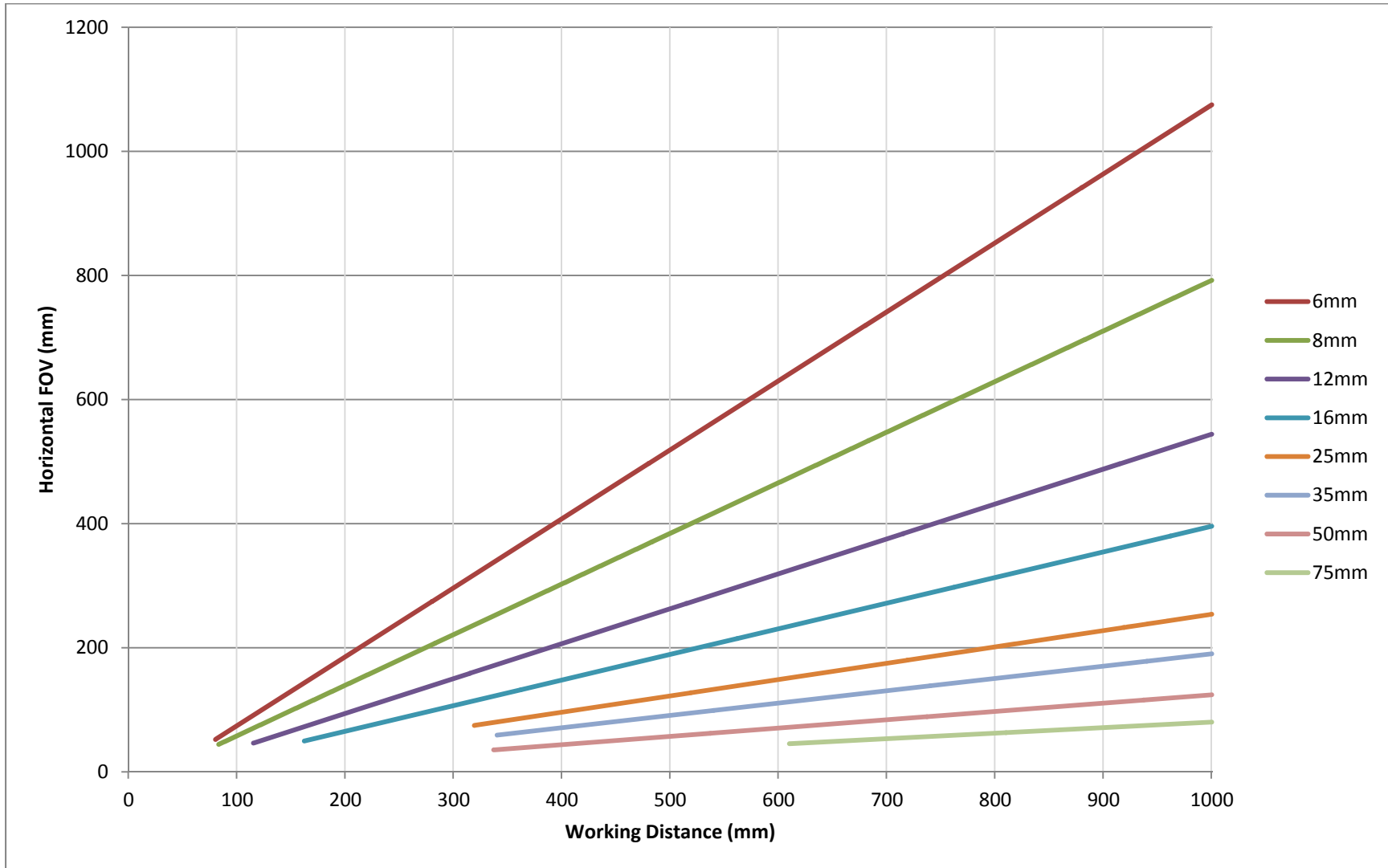
$H = 0.09 \times W - 2.13$  (minimum  $W \sim 357$  mm)

***W(H), mm***

$W = (H + 2.13)/0.09$  (minimum  $H \sim 31$  mm)

NOTE: The factory setting for the Focal Range is 0.3 m–1.2 m. The focus can be adjusted to infinity by removing the Focus Limit Screw.

### Evetar C-mount Lenses on 1.3 MP VE Series



## Evetar C-mount Lenses on 1.3 MP VE Series, FOV as a function of WD Chart

| WD (mm) | FOV (mm)          |                   |                    |                    |                    |                    |                    |                    |
|---------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|         | 6mm               | 8mm               | 12mm               | 16mm               | 25mm               | 35mm               | 50mm               | 75mm               |
| Minimum | 53 x 42<br>@ 80mm | 45 x 36<br>@ 83mm | 47 x 38<br>@ 115mm | 51 x 41<br>@ 162mm | 75 x 60<br>@ 319mm | 60 x 48<br>@ 340mm | 35 x 28<br>@ 337mm | 44 x 35<br>@ 610mm |
| 20      |                   |                   |                    |                    |                    |                    |                    |                    |
| 40      |                   |                   |                    |                    |                    |                    |                    |                    |
| 60      |                   |                   |                    |                    |                    |                    |                    |                    |
| 80      | 52 x 42           |                   |                    |                    |                    |                    |                    |                    |
| 100     | 74 x 60           | 58 x 46           |                    |                    |                    |                    |                    |                    |
| 120     | 97 x 77           | 74 x 60           | 49 x 39            |                    |                    |                    |                    |                    |
| 140     | 119 x 95          | 91 x 73           | 60 x 48            |                    |                    |                    |                    |                    |
| 160     | 141 x 113         | 107 x 86          | 72 x 57            |                    |                    |                    |                    |                    |
| 180     | 163 x 131         | 123 x 99          | 83 x 66            | 57 x 46            |                    |                    |                    |                    |
| 200     | 186 x 148         | 140 x 112         | 94 x 75            | 65 x 52            |                    |                    |                    |                    |
| 220     | 208 x 166         | 156 x 125         | 105 x 84           | 74 x 59            |                    |                    |                    |                    |
| 240     | 230 x 184         | 172 x 138         | 117 x 93           | 82 x 66            |                    |                    |                    |                    |
| 260     | 252 x 202         | 189 x 151         | 128 x 102          | 90 x 72            |                    |                    |                    |                    |
| 280     | 275 x 220         | 205 x 164         | 139 x 111          | 98 x 79            |                    |                    |                    |                    |
| 300     | 297 x 237         | 221 x 177         | 150 x 120          | 107 x 85           |                    |                    |                    |                    |
| 320     | 319 x 255         | 238 x 190         | 162 x 129          | 115 x 92           | 75 x 60            |                    |                    |                    |
| 340     | 341 x 273         | 254 x 203         | 173 x 138          | 123 x 99           | 80 x 64            | 59 x 47            | 36 x 29            |                    |
| 360     | 363 x 291         | 270 x 216         | 184 x 147          | 131 x 105          | 86 x 68            | 63 x 51            | 38 x 31            |                    |
| 380     | 386 x 309         | 286 x 229         | 195 x 156          | 140 x 112          | 91 x 73            | 67 x 54            | 41 x 33            |                    |
| 400     | 408 x 326         | 303 x 242         | 207 x 165          | 148 x 118          | 96 x 77            | 71 x 57            | 44 x 35            |                    |
| 420     | 430 x 344         | 319 x 255         | 218 x 174          | 156 x 125          | 101 x 81           | 75 x 60            | 46 x 37            |                    |
| 440     | 452 x 362         | 335 x 268         | 229 x 183          | 165 x 132          | 107 x 85           | 79 x 63            | 49 x 39            |                    |
| 460     | 475 x 380         | 352 x 281         | 240 x 192          | 173 x 138          | 112 x 90           | 83 x 66            | 52 x 41            |                    |
| 480     | 497 x 397         | 368 x 294         | 252 x 201          | 181 x 145          | 117 x 94           | 87 x 70            | 54 x 44            |                    |
| 500     | 519 x 415         | 384 x 307         | 263 x 210          | 189 x 151          | 122 x 98           | 91 x 73            | 57 x 46            |                    |
| 520     | 541 x 433         | 401 x 321         | 274 x 219          | 198 x 158          | 128 x 102          | 95 x 76            | 60 x 48            |                    |
| 540     | 564 x 451         | 417 x 334         | 285 x 228          | 206 x 165          | 133 x 106          | 99 x 79            | 62 x 50            |                    |
| 560     | 586 x 469         | 433 x 347         | 297 x 237          | 214 x 171          | 138 x 111          | 103 x 82           | 65 x 52            |                    |
| 580     | 608 x 486         | 450 x 360         | 308 x 246          | 222 x 178          | 143 x 115          | 107 x 85           | 68 x 54            |                    |
| 600     | 630 x 504         | 466 x 373         | 319 x 255          | 231 x 184          | 149 x 119          | 111 x 89           | 71 x 56            |                    |
| 620     | 653 x 522         | 482 x 386         | 330 x 264          | 239 x 191          | 154 x 123          | 115 x 92           | 73 x 59            | 46 x 37            |
| 640     | 675 x 540         | 499 x 399         | 342 x 273          | 247 x 198          | 159 x 127          | 119 x 95           | 76 x 61            | 48 x 38            |
| 660     | 697 x 558         | 515 x 412         | 353 x 282          | 255 x 204          | 165 x 132          | 123 x 98           | 79 x 63            | 50 x 40            |
| 680     | 719 x 575         | 531 x 425         | 364 x 291          | 264 x 211          | 170 x 136          | 127 x 101          | 81 x 65            | 52 x 41            |
| 700     | 741 x 593         | 547 x 438         | 375 x 300          | 272 x 217          | 175 x 140          | 131 x 105          | 84 x 67            | 53 x 43            |
| 720     | 764 x 611         | 564 x 451         | 387 x 309          | 280 x 224          | 180 x 144          | 135 x 108          | 87 x 69            | 55 x 44            |
| 740     | 786 x 629         | 580 x 464         | 398 x 318          | 288 x 231          | 186 x 148          | 139 x 111          | 89 x 71            | 57 x 46            |
| 760     | 808 x 647         | 596 x 477         | 409 x 327          | 297 x 237          | 191 x 153          | 143 x 114          | 92 x 74            | 59 x 47            |
| 780     | 830 x 664         | 613 x 490         | 420 x 336          | 305 x 244          | 196 x 157          | 147 x 117          | 95 x 76            | 60 x 48            |
| 800     | 853 x 682         | 629 x 503         | 432 x 345          | 313 x 251          | 201 x 161          | 150 x 120          | 97 x 78            | 62 x 50            |
| 820     | 875 x 700         | 645 x 516         | 443 x 354          | 321 x 257          | 207 x 165          | 154 x 124          | 100 x 80           | 64 x 51            |
| 840     | 897 x 718         | 662 x 529         | 454 x 363          | 330 x 264          | 212 x 169          | 158 x 127          | 103 x 82           | 66 x 53            |
| 860     | 919 x 735         | 678 x 542         | 465 x 372          | 338 x 270          | 217 x 174          | 162 x 130          | 105 x 84           | 68 x 54            |
| 880     | 942 x 753         | 694 x 555         | 477 x 381          | 346 x 277          | 222 x 178          | 166 x 133          | 108 x 86           | 69 x 56            |
| 900     | 964 x 771         | 711 x 569         | 488 x 390          | 354 x 284          | 228 x 182          | 170 x 136          | 111 x 89           | 71 x 57            |
| 920     | 986 x 789         | 727 x 582         | 499 x 399          | 363 x 290          | 233 x 186          | 174 x 139          | 113 x 91           | 73 x 58            |
| 940     | 1008 x 807        | 743 x 595         | 510 x 408          | 371 x 297          | 238 x 191          | 178 x 143          | 116 x 93           | 75 x 60            |
| 960     | 1031 x 824        | 760 x 608         | 522 x 417          | 379 x 303          | 243 x 195          | 182 x 146          | 119 x 95           | 77 x 61            |
| 980     | 1053 x 842        | 776 x 621         | 533 x 426          | 387 x 310          | 249 x 199          | 186 x 149          | 121 x 97           | 78 x 63            |
| 1000    | 1075 x 860        | 792 x 634         | 544 x 435          | 396 x 317          | 254 x 203          | 190 x 152          | 124 x 99           | 80 x 64            |
| 1020    | 1097 x 878        | 809 x 647         | 555 x 444          | 404 x 323          | 259 x 207          | 194 x 155          | 127 x 101          | 82 x 66            |
| 1040    | 1119 x 896        | 825 x 660         | 567 x 453          | 412 x 330          | 264 x 212          | 198 x 158          | 129 x 104          | 84 x 67            |
| 1060    | 1142 x 913        | 841 x 673         | 578 x 462          | 421 x 336          | 270 x 216          | 202 x 162          | 132 x 106          | 85 x 68            |
| 1080    | 1164 x 931        | 857 x 686         | 589 x 471          | 429 x 343          | 275 x 220          | 206 x 165          | 135 x 108          | 87 x 70            |
| 1100    | 1186 x 949        | 874 x 699         | 600 x 480          | 437 x 350          | 280 x 224          | 210 x 168          | 137 x 110          | 89 x 71            |
| 1120    | 1208 x 967        | 890 x 712         | 612 x 489          | 445 x 356          | 286 x 228          | 214 x 171          | 140 x 112          | 91 x 73            |
| 1140    | 1231 x 985        | 906 x 725         | 623 x 498          | 454 x 363          | 291 x 233          | 218 x 174          | 143 x 114          | 93 x 74            |
| 1160    | 1253 x 1002       | 923 x 738         | 634 x 507          | 462 x 369          | 296 x 237          | 222 x 178          | 145 x 116          | 94 x 76            |
| 1180    | 1275 x 1020       | 939 x 751         | 645 x 516          | 470 x 376          | 301 x 241          | 226 x 181          | 148 x 119          | 96 x 77            |
| 1200    | 1297 x 1038       | 955 x 764         | 657 x 525          | 478 x 383          | 307 x 245          | 230 x 184          | 151 x 121          | 98 x 78            |
| 1220    | 1320 x 1056       | 972 x 777         | 668 x 534          | 487 x 389          | 312 x 249          | 234 x 187          | 154 x 123          | 100 x 80           |
| 1240    | 1342 x 1073       | 988 x 790         | 679 x 543          | 495 x 396          | 317 x 254          | 238 x 190          | 156 x 125          | 102 x 81           |
| 1260    | 1364 x 1091       | 1004 x 803        | 690 x 552          | 503 x 402          | 322 x 258          | 242 x 193          | 159 x 127          | 103 x 83           |
| 1280    | 1386 x 1109       | 1021 x 816        | 702 x 561          | 511 x 409          | 328 x 262          | 246 x 197          | 162 x 129          | 105 x 84           |
| 1300    | 1409 x 1127       | 1037 x 830        | 713 x 570          | 520 x 416          | 333 x 266          | 250 x 200          | 164 x 131          | 107 x 86           |
| 1320    | 1431 x 1145       | 1053 x 843        | 724 x 579          | 528 x 422          | 338 x 271          | 254 x 203          | 167 x 134          | 109 x 87           |
| 1340    | 1453 x 1162       | 1070 x 856        | 735 x 588          | 536 x 429          | 343 x 275          | 258 x 206          | 170 x 136          | 110 x 88           |
| 1360    | 1475 x 1180       | 1086 x 869        | 747 x 597          | 544 x 436          | 349 x 279          | 262 x 209          | 172 x 138          | 112 x 90           |
| 1380    | 1497 x 1198       | 1102 x 882        | 758 x 606          | 553 x 442          | 354 x 283          | 266 x 212          | 175 x 140          | 114 x 91           |
| 1400    | 1520 x 1216       | 1118 x 895        | 769 x 615          | 561 x 449          | 359 x 287          | 270 x 216          | 178 x 142          | 116 x 93           |
| 1420    | 1542 x 1234       | 1135 x 908        | 780 x 624          | 569 x 455          | 364 x 292          | 274 x 219          | 180 x 144          | 118 x 94           |
| 1440    | 1564 x 1251       | 1151 x 921        | 792 x 633          | 577 x 462          | 370 x 296          | 277 x 222          | 183 x 146          | 119 x 96           |
| 1460    | 1586 x 1269       | 1167 x 934        | 803 x 642          | 586 x 469          | 375 x 300          | 281 x 225          | 186 x 149          | 121 x 97           |
| 1480    | 1609 x 1287       | 1184 x 947        | 814 x 651          | 594 x 475          | 380 x 304          | 285 x 228          | 188 x 151          | 123 x 98           |
| 1500    | 1631 x 1305       | 1200 x 960        | 825 x 660          | 602 x 482          | 386 x 308          | 289 x 231          | 191 x 153          | 125 x 100          |



Evetar C-mount Lenses on 1.3 MP VE Series, WD as a function of FOV Chart

| FOV (mm)    | WD (mm)           |                   |                    |                    |                    |                    |                    |                    |  |
|-------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|
|             | 6mm               | 8mm               | 12mm               | 16mm               | 25mm               | 35mm               | 50mm               | 75mm               |  |
|             | 55 x 41<br>@ 77mm | 51 x 38<br>@ 84mm | 49 x 37<br>@ 110mm | 53 x 40<br>@ 158mm | 78 x 59<br>@ 310mm | 66 x 50<br>@ 338mm | 37 x 28<br>@ 336mm | 46 x 35<br>@ 594mm |  |
| 20 x 15     |                   |                   |                    |                    |                    |                    |                    |                    |  |
| 40 x 30     |                   |                   |                    |                    |                    |                    | 372                |                    |  |
| 60 x 45     | 87                | 102               | 139                | 187                |                    |                    | 522                | 775                |  |
| 80 x 60     | 105               | 127               | 175                | 235                | 339                | 445                | 671                | 999                |  |
| 100 x 75    | 123               | 151               | 210                | 284                | 415                | 546                | 820                | 1223               |  |
| 120 x 90    | 141               | 176               | 246                | 332                | 491                | 646                | 970                | 1447               |  |
| 140 x 105   | 159               | 200               | 282                | 381                | 567                | 747                | 1119               | 1671               |  |
| 160 x 120   | 177               | 225               | 317                | 429                | 643                | 848                | 1268               | 1895               |  |
| 180 x 135   | 195               | 249               | 353                | 478                | 719                | 949                | 1418               | 2118               |  |
| 200 x 150   | 213               | 274               | 388                | 526                | 795                | 1050               | 1567               | 2342               |  |
| 220 x 165   | 231               | 299               | 424                | 574                | 871                | 1150               | 1716               | 2566               |  |
| 240 x 180   | 249               | 323               | 459                | 623                | 947                | 1251               | 1866               | 2790               |  |
| 260 x 195   | 267               | 348               | 495                | 671                | 1023               | 1352               | 2015               | 3014               |  |
| 280 x 210   | 285               | 372               | 530                | 720                | 1099               | 1453               | 2165               | 3238               |  |
| 300 x 225   | 303               | 397               | 566                | 768                | 1175               | 1554               | 2314               | 3462               |  |
| 320 x 240   | 321               | 421               | 602                | 817                | 1251               | 1654               | 2463               | 3686               |  |
| 340 x 255   | 339               | 446               | 637                | 865                | 1327               | 1755               | 2613               | 3910               |  |
| 360 x 270   | 357               | 470               | 673                | 913                | 1403               | 1856               | 2762               | 4134               |  |
| 380 x 285   | 375               | 495               | 708                | 962                | 1479               | 1957               | 2911               | 4358               |  |
| 400 x 300   | 393               | 519               | 744                | 1010               | 1555               | 2058               | 3061               | 4582               |  |
| 420 x 315   | 411               | 544               | 779                | 1059               | 1631               | 2158               | 3210               | 4806               |  |
| 440 x 330   | 429               | 568               | 815                | 1107               | 1707               | 2259               | 3359               | 5030               |  |
| 460 x 345   | 447               | 593               | 850                | 1156               | 1783               | 2360               | 3509               | 5254               |  |
| 480 x 360   | 465               | 617               | 886                | 1204               | 1859               | 2461               | 3658               | 5478               |  |
| 500 x 375   | 483               | 642               | 921                | 1253               | 1935               | 2562               | 3808               | 5702               |  |
| 520 x 390   | 501               | 666               | 957                | 1301               | 2011               | 2662               | 3957               | 5926               |  |
| 540 x 405   | 519               | 691               | 993                | 1349               | 2087               | 2763               | 4106               | 6150               |  |
| 560 x 420   | 537               | 715               | 1028               | 1398               | 2163               | 2864               | 4256               | 6374               |  |
| 580 x 435   | 555               | 740               | 1064               | 1446               | 2239               | 2965               | 4405               | 6598               |  |
| 600 x 450   | 573               | 764               | 1099               | 1495               | 2315               | 3066               | 4554               | 6822               |  |
| 620 x 465   | 591               | 789               | 1135               | 1543               | 2391               | 3166               | 4704               | 7046               |  |
| 640 x 480   | 609               | 813               | 1170               | 1592               | 2467               | 3267               | 4853               | 7270               |  |
| 660 x 495   | 627               | 838               | 1206               | 1640               | 2543               | 3368               | 5002               | 7494               |  |
| 680 x 510   | 645               | 862               | 1241               | 1688               | 2619               | 3469               | 5152               | 7718               |  |
| 700 x 525   | 663               | 887               | 1277               | 1737               | 2695               | 3570               | 5301               | 7942               |  |
| 720 x 540   | 681               | 911               | 1313               | 1785               | 2771               | 3671               | 5451               | 8166               |  |
| 740 x 555   | 699               | 936               | 1348               | 1834               | 2847               | 3771               | 5600               | 8389               |  |
| 760 x 570   | 717               | 961               | 1384               | 1882               | 2923               | 3872               | 5749               | 8613               |  |
| 780 x 585   | 735               | 985               | 1419               | 1931               | 2999               | 3973               | 5899               | 8837               |  |
| 800 x 600   | 753               | 1010              | 1455               | 1979               | 3075               | 4074               | 6048               | 9061               |  |
| 820 x 615   | 771               | 1034              | 1490               | 2028               | 3151               | 4175               | 6197               | 9285               |  |
| 840 x 630   | 789               | 1059              | 1526               | 2076               | 3227               | 4275               | 6347               | 9509               |  |
| 860 x 645   | 807               | 1083              | 1561               | 2124               | 3303               | 4376               | 6496               | 9733               |  |
| 880 x 660   | 825               | 1108              | 1597               | 2173               | 3379               | 4477               | 6645               | 9957               |  |
| 900 x 675   | 843               | 1132              | 1632               | 2221               | 3456               | 4578               | 6795               | 10181              |  |
| 920 x 690   | 861               | 1157              | 1668               | 2270               | 3532               | 4679               | 6944               | 10405              |  |
| 940 x 705   | 879               | 1181              | 1704               | 2318               | 3608               | 4779               | 7094               | 10629              |  |
| 960 x 720   | 897               | 1206              | 1739               | 2367               | 3684               | 4880               | 7243               | 10853              |  |
| 980 x 735   | 915               | 1230              | 1775               | 2415               | 3760               | 4981               | 7392               | 11077              |  |
| 1000 x 750  | 933               | 1255              | 1810               | 2463               | 3836               | 5082               | 7542               | 11301              |  |
| 1020 x 765  | 951               | 1279              | 1846               | 2512               | 3912               | 5183               | 7691               | 11525              |  |
| 1040 x 780  | 969               | 1304              | 1881               | 2560               | 3988               | 5283               | 7840               | 11749              |  |
| 1060 x 795  | 987               | 1328              | 1917               | 2609               | 4064               | 5384               | 7990               | 11973              |  |
| 1080 x 810  | 1004              | 1353              | 1952               | 2657               | 4140               | 5485               | 8139               | 12197              |  |
| 1100 x 825  | 1022              | 1377              | 1988               | 2706               | 4216               | 5586               | 8288               | 12421              |  |
| 1120 x 840  | 1040              | 1402              | 2024               | 2754               | 4292               | 5687               | 8438               | 12645              |  |
| 1140 x 855  | 1058              | 1426              | 2059               | 2803               | 4368               | 5787               | 8587               | 12869              |  |
| 1160 x 870  | 1076              | 1451              | 2095               | 2851               | 4444               | 5888               | 8737               | 13093              |  |
| 1180 x 885  | 1094              | 1475              | 2130               | 2899               | 4520               | 5989               | 8886               | 13317              |  |
| 1200 x 900  | 1112              | 1500              | 2166               | 2948               | 4596               | 6090               | 9035               | 13541              |  |
| 1220 x 915  | 1130              | 1524              | 2201               | 2996               | 4672               | 6191               | 9185               | 13765              |  |
| 1240 x 930  | 1148              | 1549              | 2237               | 3045               | 4748               | 6291               | 9334               | 13989              |  |
| 1260 x 945  | 1166              | 1573              | 2272               | 3093               | 4824               | 6392               | 9483               | 14213              |  |
| 1280 x 960  | 1184              | 1598              | 2308               | 3142               | 4900               | 6493               | 9633               | 14437              |  |
| 1300 x 975  | 1202              | 1623              | 2343               | 3190               | 4976               | 6594               | 9782               | 14660              |  |
| 1320 x 990  | 1220              | 1647              | 2379               | 3238               | 5052               | 6695               | 9932               | 14884              |  |
| 1340 x 1005 | 1238              | 1672              | 2415               | 3287               | 5128               | 6796               | 10081              | 15108              |  |
| 1360 x 1020 | 1256              | 1696              | 2450               | 3335               | 5204               | 6896               | 10230              | 15332              |  |
| 1380 x 1035 | 1274              | 1721              | 2486               | 3384               | 5280               | 6997               | 10380              | 15556              |  |
| 1400 x 1050 | 1292              | 1745              | 2521               | 3432               | 5356               | 7098               | 10529              | 15780              |  |
| 1420 x 1065 | 1310              | 1770              | 2557               | 3481               | 5432               | 7199               | 10678              | 16004              |  |
| 1440 x 1080 | 1328              | 1794              | 2592               | 3529               | 5508               | 7300               | 10828              | 16228              |  |
| 1460 x 1095 | 1346              | 1819              | 2628               | 3578               | 5584               | 7400               | 10977              | 16452              |  |
| 1480 x 1110 | 1364              | 1843              | 2663               | 3626               | 5660               | 7501               | 11126              | 16676              |  |
| 1500 x 1125 | 1382              | 1868              | 2699               | 3674               | 5736               | 7602               | 11276              | 16900              |  |

## Evetar Lens equations for VE Series 1.3 MP

H = horizontal FOV size, W = working distance



### 6 mm Megapixel lens

**Banner model:** LCF06LEVMP (p/n 97345)

**Evetar model:** MV118FM06C

1/1.8-inch format, 34 mm filter, minimum f/1.6

***H(W), mm***

$H = 1.11 \times W - 36.79$  (minimum W ~ 80 mm)

***W(H), mm***

$W = (H + 36.79)/1.11$  (minimum H ~ 53 mm)



### 8 mm Megapixel lens

**Banner model:** LCF08LEVMP (p/n 97346)

**Evetar model:** MV118FM08C

1/1.8-inch format, 27mm filter, min f/1.4

***H(W), mm***

$H = 0.82 \times W - 23.49$  (minimum W ~ 83 mm)

***W(H), mm***

$W = (H + 23.49)/0.82$  (minimum H ~ 45 mm)



### 12 mm Megapixel lens

**Banner model:** LCF12LEVMP (p/n 97347)

**Evetar model:** MV23FM12C

2/3-inch format, 27 mm filter, minimum f/1.6

***H(W), mm***

$H = 0.56 \times W - 18.43$  (minimum W ~ 115 mm)

***W(H), mm***

$W = (H + 18.43)/0.56$  (minimum H ~ 47 mm)



### 16 mm Megapixel lens

**Banner model:** LCF16LEVMP (p/n 97348)

**Evetar model:** MV23FM16CR1

2/3-inch format, 27 mm filter, minimum f/1.6

***H(W), mm***

$H = 0.41 \times W - 17.16$  (minimum W ~ 162 mm)

***W(H), mm***

$W = (H + 17.16)/0.41$  (minimum H ~ 51mm)



### 25 mm Megapixel lens

**Banner model:** LCF25LEVMP (p/n 97349)

**Evetar model:** MV23FM25C

2/3-inch format, 27 mm filter, minimum f/1.8

***H(W), mm***

$H = 0.26 \times W - 9.15$  (minimum  $W \sim 319$  mm)

***W(H), mm***

$W = (H + 9.15)/0.26$  (minimum  $H \sim 75$  mm)



### 35 mm Megapixel lens

**Banner model:** LCF35LEVMP (p/n 97350)

**Evetar model:** MV23FM35C

2/3-inch format, 27 mm filter, minimum f/2.0

***H(W), mm***

$H = 0.198 \times W - 8.23$  (minimum  $W \sim 340$  mm)

***W(H), mm***

$W = (H + 8.23)/0.198$  (minimum  $H \sim 60$  mm)



### 50 mm Megapixel lens

**Banner model:** LCF50LEVMP (p/n 97351)

**Evetar model:** MV23FM50C

2/3-inch format, 30.5 mm filter, minimum f/2.6

***H(W), mm***

$H = 0.134 \times W - 9.83$  (minimum  $W \sim 337$  mm)

***W(H), mm***

$W = (H + 9.83)/0.134$  (minimum  $H \sim 35$  mm)



### 75 mm Megapixel lens

**Banner model:** LCF75LEVMP (p/n 97352)

**Evetar model:** MV11FM75C

1-inch format, 34 mm filter, minimum f/2.8

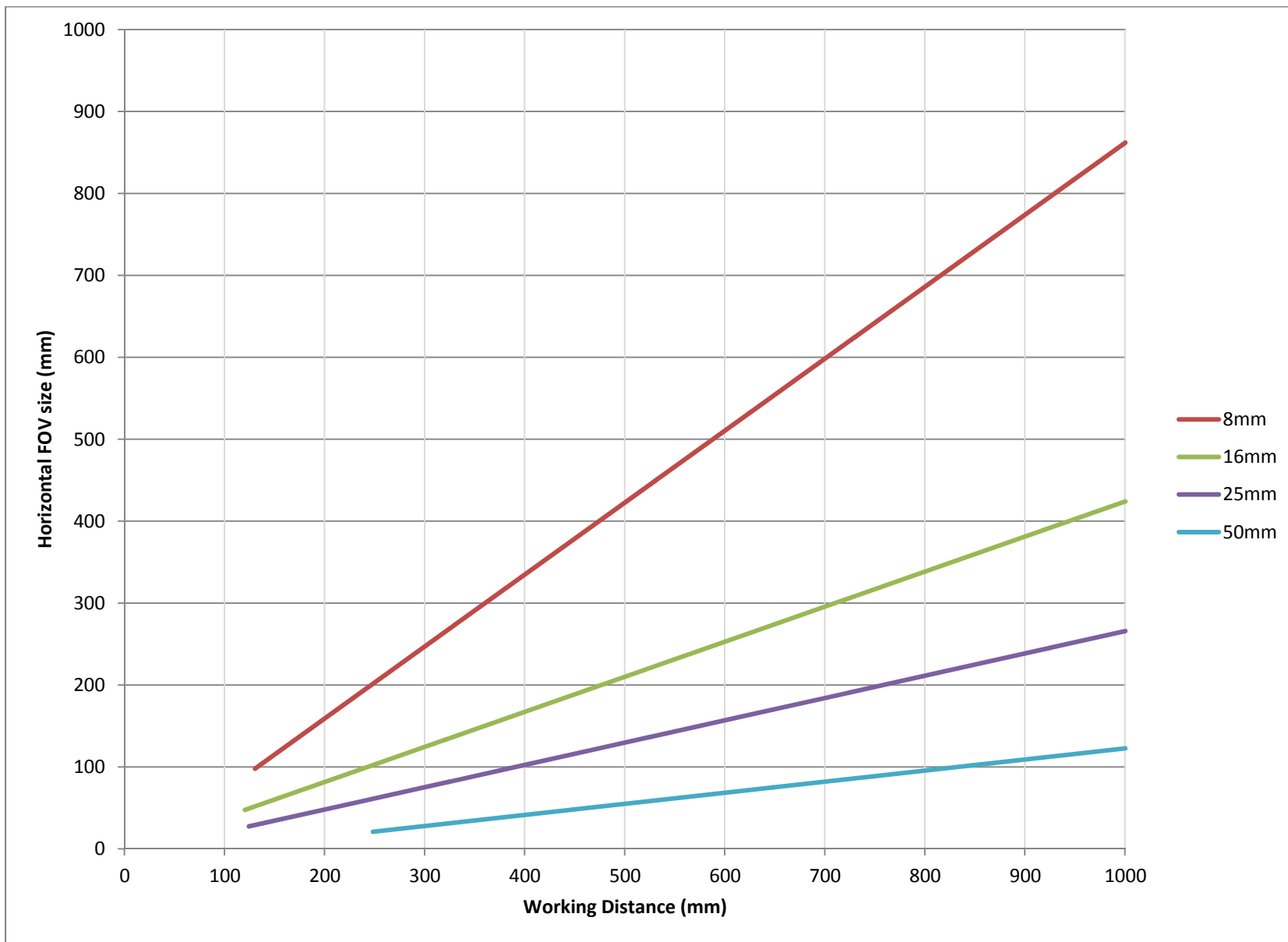
***H(W), mm***

$H = 0.089 \times W - 9.18$  (minimum  $W \sim 610$  mm)

***W(H), mm***

$W = (H + 9.18)/0.089$  (minimum  $H \sim 44$  mm)

### Tamron C-mount Lenses on 1.3MP VE Series



VE Series

Tamron C-mount Lenses on 1.3 MP VE Series, FOV as a function of WD Chart

| WD (mm) | 8mm                | 16mm               | 25mm               | 50mm               |
|---------|--------------------|--------------------|--------------------|--------------------|
| Minimum | 99 x 79<br>@ 130mm | 47 x 38<br>@ 120mm | 27 x 22<br>@ 124mm | 20 x 16<br>@ 248mm |
| 20      |                    |                    |                    |                    |
| 40      |                    |                    |                    |                    |
| 60      |                    |                    |                    |                    |
| 80      |                    |                    |                    |                    |
| 100     |                    |                    |                    |                    |
| 120     |                    | 48 x 38            |                    |                    |
| 140     | 107 x 85           | 56 x 45            | 32 x 25            |                    |
| 160     | 124 x 99           | 65 x 52            | 37 x 30            |                    |
| 180     | 142 x 113          | 73 x 59            | 43 x 34            |                    |
| 200     | 159 x 128          | 82 x 65            | 48 x 38            |                    |
| 220     | 177 x 142          | 90 x 72            | 54 x 43            |                    |
| 240     | 195 x 156          | 99 x 79            | 59 x 47            |                    |
| 260     | 212 x 170          | 107 x 86           | 64 x 52            | 23 x 18            |
| 280     | 230 x 184          | 116 x 93           | 70 x 56            | 25 x 20            |
| 300     | 247 x 198          | 125 x 100          | 75 x 60            | 28 x 22            |
| 320     | 265 x 212          | 133 x 106          | 81 x 65            | 31 x 25            |
| 340     | 282 x 226          | 142 x 113          | 86 x 69            | 33 x 27            |
| 360     | 300 x 240          | 150 x 120          | 92 x 73            | 36 x 29            |
| 380     | 318 x 254          | 159 x 127          | 97 x 78            | 39 x 31            |
| 400     | 335 x 268          | 167 x 134          | 103 x 82           | 41 x 33            |
| 420     | 353 x 282          | 176 x 141          | 108 x 86           | 44 x 35            |
| 440     | 370 x 296          | 184 x 148          | 113 x 91           | 47 x 38            |
| 460     | 388 x 310          | 193 x 154          | 119 x 95           | 50 x 40            |
| 480     | 405 x 324          | 202 x 161          | 124 x 99           | 52 x 42            |
| 500     | 423 x 338          | 210 x 168          | 130 x 104          | 55 x 44            |
| 520     | 440 x 352          | 219 x 175          | 135 x 108          | 58 x 46            |
| 540     | 458 x 366          | 227 x 182          | 141 x 113          | 60 x 48            |
| 560     | 476 x 380          | 236 x 189          | 146 x 117          | 63 x 51            |
| 580     | 493 x 395          | 244 x 196          | 152 x 121          | 66 x 53            |
| 600     | 511 x 409          | 253 x 202          | 157 x 126          | 69 x 55            |
| 620     | 528 x 423          | 261 x 209          | 162 x 130          | 71 x 57            |
| 640     | 546 x 437          | 270 x 216          | 168 x 134          | 74 x 59            |
| 660     | 563 x 451          | 279 x 223          | 173 x 139          | 77 x 61            |
| 680     | 581 x 465          | 287 x 230          | 179 x 143          | 79 x 63            |
| 700     | 599 x 479          | 296 x 237          | 184 x 147          | 82 x 66            |
| 720     | 616 x 493          | 304 x 243          | 190 x 152          | 85 x 68            |
| 740     | 634 x 507          | 313 x 250          | 195 x 156          | 87 x 70            |
| 760     | 651 x 521          | 321 x 257          | 201 x 160          | 90 x 72            |
| 780     | 669 x 535          | 330 x 264          | 206 x 165          | 93 x 74            |
| 800     | 686 x 549          | 339 x 271          | 211 x 169          | 96 x 76            |
| 820     | 704 x 563          | 347 x 278          | 217 x 174          | 98 x 79            |
| 840     | 721 x 577          | 356 x 285          | 222 x 178          | 101 x 81           |
| 860     | 739 x 591          | 364 x 291          | 228 x 182          | 104 x 83           |
| 880     | 757 x 605          | 373 x 298          | 233 x 187          | 106 x 85           |
| 900     | 774 x 619          | 381 x 305          | 239 x 191          | 109 x 87           |
| 920     | 792 x 633          | 390 x 312          | 244 x 195          | 112 x 89           |
| 940     | 809 x 647          | 398 x 319          | 250 x 200          | 115 x 92           |
| 960     | 827 x 661          | 407 x 326          | 255 x 204          | 117 x 94           |
| 980     | 844 x 676          | 416 x 332          | 260 x 208          | 120 x 96           |
| 1000    | 862 x 690          | 424 x 339          | 266 x 213          | 123 x 98           |
| 1020    | 880 x 704          | 433 x 346          | 271 x 217          | 125 x 100          |
| 1040    | 897 x 718          | 441 x 353          | 277 x 221          | 128 x 102          |
| 1060    | 915 x 732          | 450 x 360          | 282 x 226          | 131 x 105          |
| 1080    | 932 x 746          | 458 x 367          | 288 x 230          | 133 x 107          |
| 1100    | 950 x 760          | 467 x 374          | 293 x 234          | 136 x 109          |
| 1120    | 967 x 774          | 475 x 380          | 299 x 239          | 139 x 111          |
| 1140    | 985 x 788          | 484 x 387          | 304 x 243          | 142 x 113          |
| 1160    | 1003 x 802         | 493 x 394          | 309 x 248          | 144 x 115          |
| 1180    | 1020 x 816         | 501 x 401          | 315 x 252          | 147 x 118          |
| 1200    | 1038 x 830         | 510 x 408          | 320 x 256          | 150 x 120          |
| 1220    | 1055 x 844         | 518 x 415          | 326 x 261          | 152 x 122          |
| 1240    | 1073 x 858         | 527 x 421          | 331 x 265          | 155 x 124          |
| 1260    | 1090 x 872         | 535 x 428          | 337 x 269          | 158 x 126          |
| 1280    | 1108 x 886         | 544 x 435          | 342 x 274          | 161 x 128          |
| 1300    | 1125 x 900         | 552 x 442          | 348 x 278          | 163 x 131          |
| 1320    | 1143 x 914         | 561 x 449          | 353 x 282          | 166 x 133          |
| 1340    | 1161 x 928         | 570 x 456          | 358 x 287          | 169 x 135          |
| 1360    | 1178 x 943         | 578 x 463          | 364 x 291          | 171 x 137          |
| 1380    | 1196 x 957         | 587 x 469          | 369 x 295          | 174 x 139          |
| 1400    | 1213 x 971         | 595 x 476          | 375 x 300          | 177 x 141          |
| 1420    | 1231 x 985         | 604 x 483          | 380 x 304          | 179 x 144          |
| 1440    | 1248 x 999         | 612 x 490          | 386 x 309          | 182 x 146          |
| 1460    | 1266 x 1013        | 621 x 497          | 391 x 313          | 185 x 148          |
| 1480    | 1284 x 1027        | 629 x 504          | 397 x 317          | 188 x 150          |
| 1500    | 1301 x 1041        | 638 x 510          | 402 x 322          | 190 x 152          |

Tamron C-mount Lenses on 1.3 MP VE Series, WD as a function of FOV Chart

| FOV (mm)    | 8mm     |                    | 16mm               |                    | 25mm               |      | 50mm |       |
|-------------|---------|--------------------|--------------------|--------------------|--------------------|------|------|-------|
|             | Minimum | 99 x 79<br>@ 130mm | 47 x 38<br>@ 120mm | 27 x 22<br>@ 124mm | 20 x 16<br>@ 248mm |      |      |       |
| 20 x 16     |         |                    |                    |                    |                    |      |      | 241   |
| 40 x 32     |         |                    |                    |                    |                    | 170  |      | 389   |
| 60 x 48     |         |                    |                    | 149                |                    | 244  |      | 537   |
| 80 x 64     |         |                    |                    | 196                |                    | 317  |      | 685   |
| 100 x 80    |         | 132                |                    | 243                |                    | 391  |      | 833   |
| 120 x 96    |         | 155                |                    | 289                |                    | 464  |      | 980   |
| 140 x 112   |         | 178                |                    | 336                |                    | 538  |      | 1128  |
| 160 x 128   |         | 201                |                    | 383                |                    | 611  |      | 1276  |
| 180 x 144   |         | 223                |                    | 430                |                    | 685  |      | 1424  |
| 200 x 160   |         | 246                |                    | 476                |                    | 758  |      | 1572  |
| 220 x 176   |         | 269                |                    | 523                |                    | 831  |      | 1719  |
| 240 x 192   |         | 292                |                    | 570                |                    | 905  |      | 1867  |
| 260 x 208   |         | 315                |                    | 617                |                    | 978  |      | 2015  |
| 280 x 224   |         | 337                |                    | 663                |                    | 1052 |      | 2163  |
| 300 x 240   |         | 360                |                    | 710                |                    | 1125 |      | 2311  |
| 320 x 256   |         | 383                |                    | 757                |                    | 1199 |      | 2459  |
| 340 x 272   |         | 406                |                    | 803                |                    | 1272 |      | 2606  |
| 360 x 288   |         | 428                |                    | 850                |                    | 1346 |      | 2754  |
| 380 x 304   |         | 451                |                    | 897                |                    | 1419 |      | 2902  |
| 400 x 320   |         | 474                |                    | 944                |                    | 1493 |      | 3050  |
| 420 x 336   |         | 497                |                    | 990                |                    | 1566 |      | 3198  |
| 440 x 352   |         | 519                |                    | 1037               |                    | 1640 |      | 3345  |
| 460 x 368   |         | 542                |                    | 1084               |                    | 1713 |      | 3493  |
| 480 x 384   |         | 565                |                    | 1131               |                    | 1787 |      | 3641  |
| 500 x 400   |         | 588                |                    | 1177               |                    | 1860 |      | 3789  |
| 520 x 416   |         | 611                |                    | 1224               |                    | 1934 |      | 3937  |
| 540 x 432   |         | 633                |                    | 1271               |                    | 2007 |      | 4085  |
| 560 x 448   |         | 656                |                    | 1318               |                    | 2081 |      | 4232  |
| 580 x 464   |         | 679                |                    | 1364               |                    | 2154 |      | 4380  |
| 600 x 480   |         | 702                |                    | 1411               |                    | 2228 |      | 4528  |
| 620 x 496   |         | 724                |                    | 1458               |                    | 2301 |      | 4676  |
| 640 x 512   |         | 747                |                    | 1505               |                    | 2374 |      | 4824  |
| 660 x 528   |         | 770                |                    | 1551               |                    | 2448 |      | 4971  |
| 680 x 544   |         | 793                |                    | 1598               |                    | 2521 |      | 5119  |
| 700 x 560   |         | 816                |                    | 1645               |                    | 2595 |      | 5267  |
| 720 x 576   |         | 838                |                    | 1692               |                    | 2668 |      | 5415  |
| 740 x 592   |         | 861                |                    | 1738               |                    | 2742 |      | 5563  |
| 760 x 608   |         | 884                |                    | 1785               |                    | 2815 |      | 5711  |
| 780 x 624   |         | 907                |                    | 1832               |                    | 2889 |      | 5858  |
| 800 x 640   |         | 929                |                    | 1878               |                    | 2962 |      | 6006  |
| 820 x 656   |         | 952                |                    | 1925               |                    | 3036 |      | 6154  |
| 840 x 672   |         | 975                |                    | 1972               |                    | 3109 |      | 6302  |
| 860 x 688   |         | 998                |                    | 2019               |                    | 3183 |      | 6450  |
| 880 x 704   |         | 1021               |                    | 2065               |                    | 3256 |      | 6598  |
| 900 x 720   |         | 1043               |                    | 2112               |                    | 3330 |      | 6745  |
| 920 x 736   |         | 1066               |                    | 2159               |                    | 3403 |      | 6893  |
| 940 x 752   |         | 1089               |                    | 2206               |                    | 3477 |      | 7041  |
| 960 x 768   |         | 1112               |                    | 2252               |                    | 3550 |      | 7189  |
| 980 x 784   |         | 1134               |                    | 2299               |                    | 3624 |      | 7337  |
| 1000 x 800  |         | 1157               |                    | 2346               |                    | 3697 |      | 7484  |
| 1020 x 816  |         | 1180               |                    | 2393               |                    | 3770 |      | 7632  |
| 1040 x 832  |         | 1203               |                    | 2439               |                    | 3844 |      | 7780  |
| 1060 x 848  |         | 1225               |                    | 2486               |                    | 3917 |      | 7928  |
| 1080 x 864  |         | 1248               |                    | 2533               |                    | 3991 |      | 8076  |
| 1100 x 880  |         | 1271               |                    | 2580               |                    | 4064 |      | 8224  |
| 1120 x 896  |         | 1294               |                    | 2626               |                    | 4138 |      | 8371  |
| 1140 x 912  |         | 1317               |                    | 2673               |                    | 4211 |      | 8519  |
| 1160 x 928  |         | 1339               |                    | 2720               |                    | 4285 |      | 8667  |
| 1180 x 944  |         | 1362               |                    | 2767               |                    | 4358 |      | 8815  |
| 1200 x 960  |         | 1385               |                    | 2813               |                    | 4432 |      | 8963  |
| 1220 x 976  |         | 1408               |                    | 2860               |                    | 4505 |      | 9110  |
| 1240 x 992  |         | 1430               |                    | 2907               |                    | 4579 |      | 9258  |
| 1260 x 1008 |         | 1453               |                    | 2954               |                    | 4652 |      | 9406  |
| 1280 x 1024 |         | 1476               |                    | 3000               |                    | 4726 |      | 9554  |
| 1300 x 1040 |         | 1499               |                    | 3047               |                    | 4799 |      | 9702  |
| 1320 x 1056 |         | 1522               |                    | 3094               |                    | 4873 |      | 9850  |
| 1340 x 1072 |         | 1544               |                    | 3140               |                    | 4946 |      | 9997  |
| 1360 x 1088 |         | 1567               |                    | 3187               |                    | 5020 |      | 10145 |
| 1380 x 1104 |         | 1590               |                    | 3234               |                    | 5093 |      | 10293 |
| 1400 x 1120 |         | 1613               |                    | 3281               |                    | 5167 |      | 10441 |
| 1420 x 1136 |         | 1635               |                    | 3327               |                    | 5240 |      | 10589 |
| 1440 x 1152 |         | 1658               |                    | 3374               |                    | 5313 |      | 10736 |
| 1460 x 1168 |         | 1681               |                    | 3421               |                    | 5387 |      | 10884 |
| 1480 x 1184 |         | 1704               |                    | 3468               |                    | 5460 |      | 11032 |
| 1500 x 1200 |         | 1726               |                    | 3514               |                    | 5534 |      | 11180 |

## Tamron Lens equations for VE Series 1.3 MP

H = horizontal FOV size, W = working distance



### 8 mm Megapixel lens

Banner model: LCF08LTMP (p/n 81530)

Tamron model: M118FM08

1/1.8-inch format, 25.5 mm filter, minimum f/1.4

***H(W), mm***

$H = 0.88 \times W - 16.21$  (minimum W ~ 130 mm)

***W(H), mm***

$W = (H + 16.21)/0.88$  (minimum H ~ 99 mm)



### 16 mm Megapixel lens

Banner model: LCF16LTMP (p/n 81532)

Tamron model: M118FM16

1/1.8-inch format, 25.5 mm filter, minimum f/1.4

***H(W), mm***

$H = 0.428 \times W - 3.81$  (minimum W ~ 120 mm)

***W(H), mm***

$W = (H + 3.81)/0.428$  (minimum H ~ 47 mm)



### 25 mm Megapixel lens

Banner model: LCF25LTMP (p/n 81533)

Tamron model: M118FM25

1/1.8-inch format, 25.5 mm filter, minimum f/1.6

***H(W), mm***

$H = 0.27 \times W - 6.33$  (minimum W ~ 124 mm)

***W(H), mm***

$W = (H + 6.33)/0.27$  (minimum H ~ 27 mm)



### 50 mm Megapixel lens

Banner model: LCF50LTMP (p/n 81534)

Tamron model: M118FM50

1/1.8-inch format, 25.5 mm filter, minimum f/2.8

***H(W), mm***

$H = 0.135 \times W - 12.64$  (minimum W ~ 248 mm)

***W(H), mm***

$W = (H + 12.64)/0.135$  (minimum H ~ 20 mm)

