

1.3 MP Lens Charts

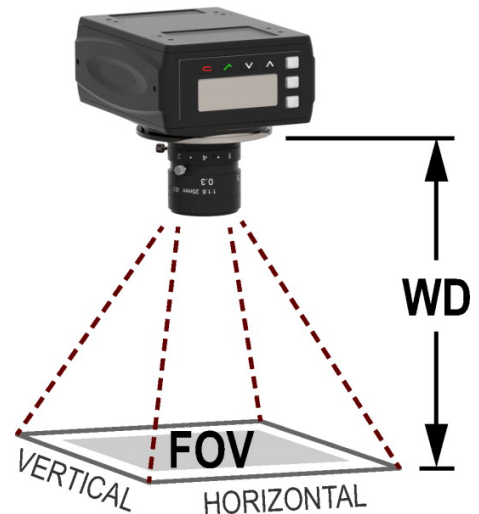
This paper offers information useful for selecting a C-mount lens for the VE Series 1.3 MP smart camera.

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.

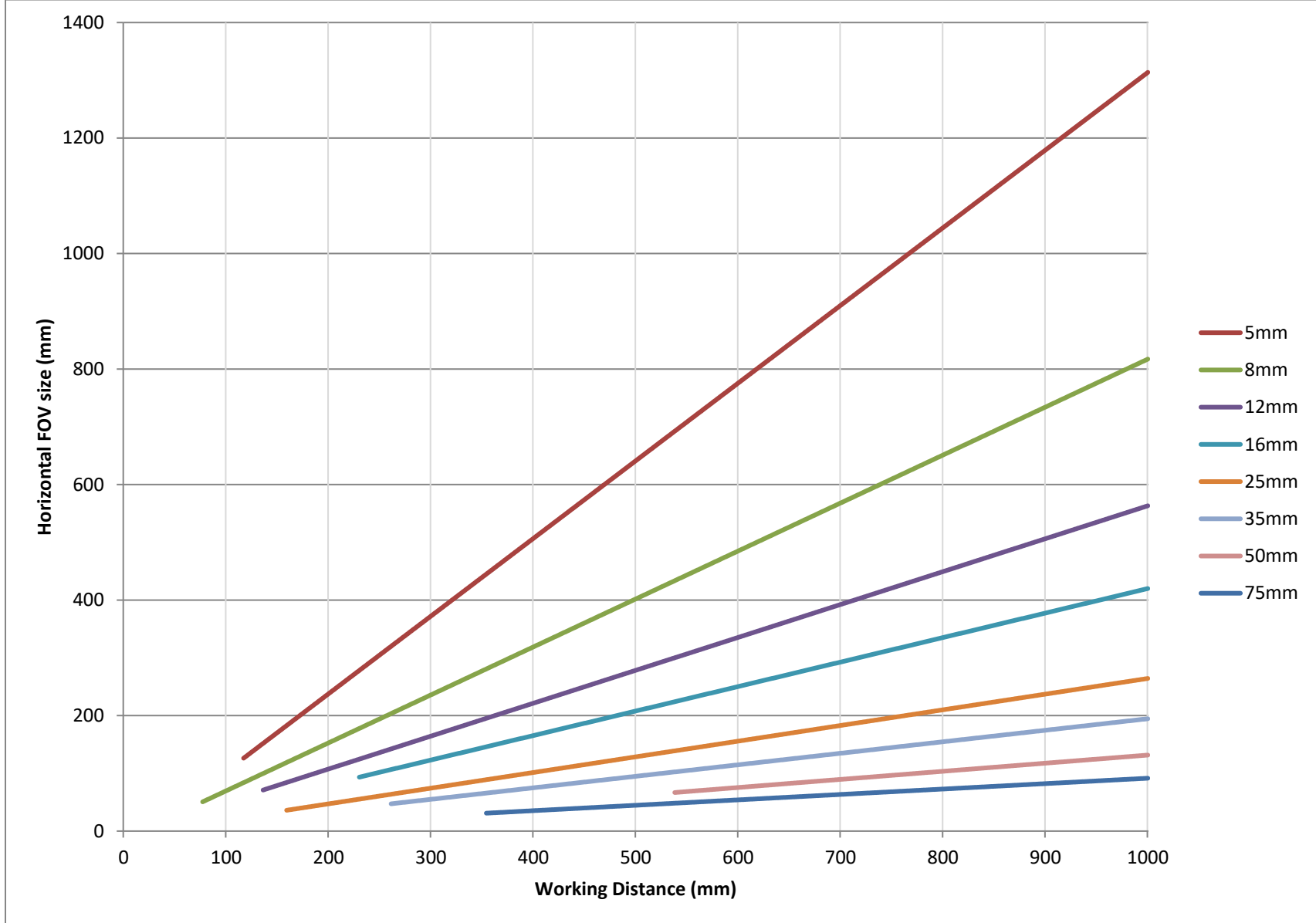
Imager Resolution: 1280 px (H) × 1024 px (V)
Pixel Size: 5.3 μm × 5.3 μm
Image Size: 6.9 mm (H) × 5.5 mm (V), 8.7 mm (diagonal)

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 @ 117mm	52 x 42 @ 77mm	71 x 57 @ 136mm	93 x 74 @ 230mm	36 x 29 @ 159mm	47 x 38 @ 261mm	68 x 54 @ 538mm	31 x 25 @ 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

Computer 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	
Minimum		123 x 98 @ 117mm	52 x 42 @ 77mm	71 x 57 @ 136mm	93 x 74 @ 230mm	36 x 29 @ 159mm	47 x 38 @ 261mm	68 x 54 @ 538mm	31 x 25 @ 357mm	
20 x 16										
40 x 32						173			450	
60 x 48			88			247	325		663	
80 x 64			112	152		321	425	632	877	
100 x 80			136	187	246	395	526	775	1090	
120 x 96			160	222	293	468	626	917	1303	
140 x 112	127		185	257	340	542	726	1060	1517	
160 x 128	142		209	292	387	616	827	1202	1730	
180 x 144	157		233	327	434	689	927	1345	1944	
200 x 160	172		257	362	481	763	1027	1487	2157	
220 x 176	187		281	397	529	837	1128	1630	2371	
240 x 192	202		305	433	576	910	1228	1772	2584	
260 x 208	216		329	468	623	984	1328	1915	2798	
280 x 224	231		353	503	670	1058	1429	2058	3011	
300 x 240	246		377	538	717	1131	1529	2200	3224	
320 x 256	261		401	573	764	1205	1629	2343	3438	
340 x 272	276		425	608	811	1279	1730	2485	3651	
360 x 288	291		449	643	859	1353	1830	2628	3865	
380 x 304	306		474	678	906	1426	1931	2770	4078	
400 x 320	321		498	713	953	1500	2031	2913	4292	
420 x 336	335		522	748	1000	1574	2131	3055	4505	
440 x 352	350		546	784	1047	1647	2232	3198	4719	
460 x 368	365		570	819	1094	1721	2332	3341	4932	
480 x 384	380		594	854	1142	1795	2432	3483	5145	
500 x 400	395		618	889	1189	1868	2533	3626	5359	
520 x 416	410		642	924	1236	1942	2633	3768	5572	
540 x 432	425		666	959	1283	2016	2733	3911	5786	
560 x 448	440		690	994	1330	2089	2834	4053	5999	
580 x 464	454		714	1029	1377	2163	2934	4196	6213	
600 x 480	469		738	1064	1425	2237	3034	4338	6426	
620 x 496	484		762	1100	1472	2311	3135	4481	6640	
640 x 512	499		787	1135	1519	2384	3235	4623	6853	
660 x 528	514		811	1170	1566	2458	3335	4766	7066	
680 x 544	529		835	1205	1613	2532	3436	4909	7280	
700 x 560	544		859	1240	1660	2605	3536	5051	7493	
720 x 576	559		883	1275	1708	2679	3637	5194	7707	
740 x 592	573		907	1310	1755	2753	3737	5336	7920	
760 x 608	588		931	1345	1802	2826	3837	5479	8134	
780 x 624	603		955	1380	1849	2900	3938	5621	8347	
800 x 640	618		979	1416	1896	2974	4038	5764	8561	
820 x 656	633		1003	1451	1943	3047	4138	5906	8774	
840 x 672	648		1027	1486	1990	3121	4239	6049	8988	
860 x 688	663		1051	1521	2038	3195	4339	6192	9201	
880 x 704	677		1075	1556	2085	3269	4439	6334	9414	
900 x 720	692		1100	1591	2132	3342	4540	6477	9628	
920 x 736	707		1124	1626	2179	3416	4640	6619	9841	
940 x 752	722		1148	1661	2226	3490	4740	6762	10055	
960 x 768	737		1172	1696	2273	3563	4841	6904	10268	
980 x 784	752		1196	1731	2321	3637	4941	7047	10482	
1000 x 800	767		1220	1767	2368	3711	5041	7189	10695	
1020 x 816	782		1244	1802	2415	3784	5142	7332	10909	
1040 x 832	796		1268	1837	2462	3858	5242	7475	11122	
1060 x 848	811		1292	1872	2509	3932	5342	7617	11335	
1080 x 864	826		1316	1907	2556	4005	5443	7760	11549	
1100 x 880	841		1340	1942	2604	4079	5543	7902	11762	
1120 x 896	856		1364	1977	2651	4153	5644	8045	11976	
1140 x 912	871		1389	2012	2698	4227	5744	8187	12189	
1160 x 928	886		1413	2047	2745	4300	5844	8330	12403	
1180 x 944	901		1437	2083	2792	4374	5945	8472	12616	
1200 x 960	915		1461	2118	2839	4448	6045	8615	12830	
1220 x 976	930		1485	2153	2886	4521	6145	8757	13043	
1240 x 992	945		1509	2188	2934	4595	6246	8900	13256	
1260 x 1008	960		1533	2223	2981	4669	6346	9043	13470	
1280 x 1024	975		1557	2258	3028	4742	6446	9185	13683	
1300 x 1040	990		1581	2293	3075	4816	6547	9328	13897	
1320 x 1056	1005		1605	2328	3122	4890	6647	9470	14110	
1340 x 1072	1020		1629	2363	3169	4963	6747	9613	14324	
1360 x 1088	1034		1653	2398	3217	5037	6848	9755	14537	
1380 x 1104	1049		1677	2434	3264	5111	6948	9898	14751	
1400 x 1120	1064		1702	2469	3311	5185	7048	10040	14964	
1420 x 1136	1079		1726	2504	3358	5258	7149	10183	15177	
1440 x 1152	1094		1750	2539	3405	5332	7249	10326	15391	
1460 x 1168	1109		1774	2574	3452	5406	7350	10468	15604	
1480 x 1184	1124		1798	2609	3500	5479	7450	10611	15818	
1500 x 1200	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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 1.34 \times W - 31.15 \text{ (minimum } W \sim 117 \text{ mm)}$$

W(H), mm

$$W = (H + 31.15)/1.34 \text{ (minimum } H \sim 123 \text{ mm)}$$



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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 0.83 \times W - 13.31 \text{ (minimum } W \sim 77 \text{ mm)}$$

W(H), mm

$$W = (H + 13.31)/0.83 \text{ (minimum } H \sim 52 \text{ mm)}$$



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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 0.57 \times W - 6.42 \text{ (minimum } W \sim 136 \text{ mm)}$$

W(H), mm

$$W = (H + 6.42)/0.57 \text{ (minimum } H \sim 71 \text{ mm)}$$



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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 0.424 \times W - 4.15 \text{ (minimum } W \sim 230 \text{ mm)}$$

W(H), mm

$$W = (H + 4.15)/0.424 \text{ (minimum } H \sim 93 \text{ mm)}$$



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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

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

W(H), mm

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



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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

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

W(H), mm

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



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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

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

W(H), mm

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



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, does not fit with a sealed lens cover

H(W), mm

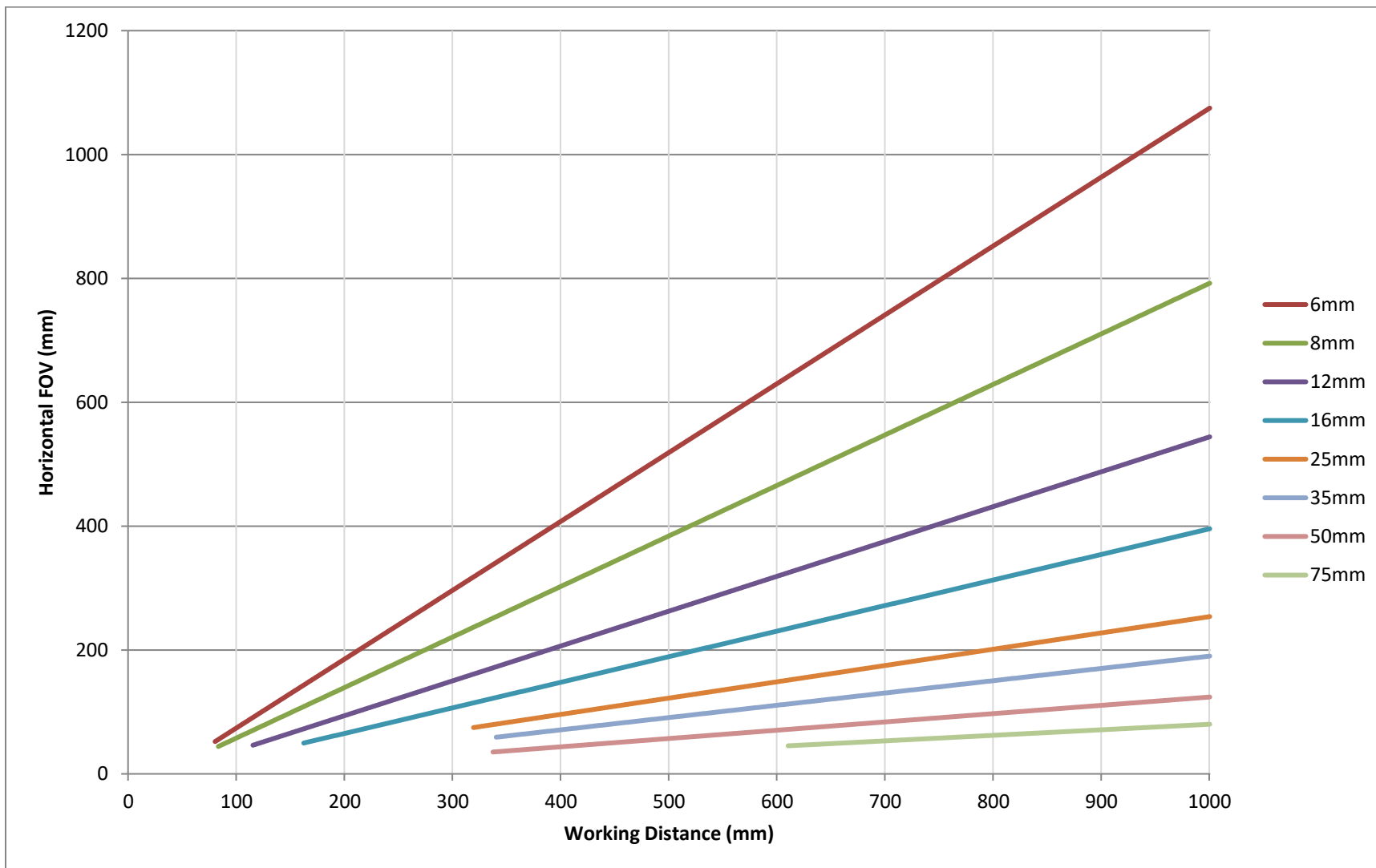
$$H = 0.09 \times W - 2.13 \text{ (minimum } W \sim 357 \text{ mm)}$$

W(H), mm

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

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
<i>Minimum</i>	53 x 42 @ 80mm	45 x 36 @ 83mm	47 x 38 @ 115mm	51 x 41 @ 162mm	75 x 60 @ 319mm	60 x 48 @ 340mm	35 x 28 @ 337mm	44 x 35 @ 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 44 @ 77mm	51 x 41 @ 84mm	49 x 39 @ 110mm	53 x 42 @ 158mm	78 x 62 @ 310mm	66 x 53 @ 338mm	37 x 30 @ 336mm	46 x 37 @ 594mm								
20 x 16																	
40 x 32														372			
60 x 48	87	102	139	187										522	775		
80 x 64	105	127	175	235	339	445								671	999		
100 x 80	123	151	210	284	415	546								820	1223		
120 x 96	141	176	246	332	491	646								970	1447		
140 x 112	159	200	282	381	567	747								1119	1671		
160 x 128	177	225	317	429	643	848								1268	1895		
180 x 144	195	249	353	478	719	949								1418	2118		
200 x 160	213	274	388	526	795	1050								1567	2342		
220 x 176	231	299	424	574	871	1150								1716	2566		
240 x 192	249	323	459	623	947	1251								1866	2790		
260 x 208	267	348	495	671	1023	1352								2015	3014		
280 x 224	285	372	530	720	1099	1453								2165	3238		
300 x 240	303	397	566	768	1175	1554								2314	3462		
320 x 256	321	421	602	817	1251	1654								2463	3686		
340 x 272	339	446	637	865	1327	1755								2613	3910		
360 x 288	357	470	673	913	1403	1856								2762	4134		
380 x 304	375	495	708	962	1479	1957								2911	4358		
400 x 320	393	519	744	1010	1555	2058								3061	4582		
420 x 336	411	544	779	1059	1631	2158								3210	4806		
440 x 352	429	568	815	1107	1707	2259								3359	5030		
460 x 368	447	593	850	1156	1783	2360								3509	5254		
480 x 384	465	617	886	1204	1859	2461								3658	5478		
500 x 400	483	642	921	1253	1935	2562								3808	5702		
520 x 416	501	666	957	1301	2011	2662								3957	5926		
540 x 432	519	691	993	1349	2087	2763								4106	6150		
560 x 448	537	715	1028	1398	2163	2864								4256	6374		
580 x 464	555	740	1064	1446	2239	2965								4405	6598		
600 x 480	573	764	1099	1495	2315	3066								4554	6822		
620 x 496	591	789	1135	1543	2391	3166								4704	7046		
640 x 512	609	813	1170	1592	2467	3267								4853	7270		
660 x 528	627	838	1206	1640	2543	3368								5002	7494		
680 x 544	645	862	1241	1688	2619	3469								5152	7718		
700 x 560	663	887	1277	1737	2695	3570								5301	7942		
720 x 576	681	911	1313	1785	2771	3671								5451	8166		
740 x 592	699	936	1348	1834	2847	3771								5600	8389		
760 x 608	717	961	1384	1882	2923	3872								5749	8613		
780 x 624	735	985	1419	1931	2999	3973								5899	8837		
800 x 640	753	1010	1455	1979	3075	4074								6048	9061		
820 x 656	771	1034	1490	2028	3151	4175								6197	9285		
840 x 672	789	1059	1526	2076	3227	4275								6347	9509		
860 x 688	807	1083	1561	2124	3303	4376								6496	9733		
880 x 704	825	1108	1597	2173	3379	4477								6645	9957		
900 x 720	843	1132	1632	2221	3456	4578								6795	10181		
920 x 736	861	1157	1668	2270	3532	4679								6944	10405		
940 x 752	879	1181	1704	2318	3608	4779								7094	10629		
960 x 768	897	1206	1739	2367	3684	4880								7243	10853		
980 x 784	915	1230	1775	2415	3760	4981								7392	11077		
1000 x 800	933	1255	1810	2463	3836	5082								7542	11301		
1020 x 816	951	1279	1846	2512	3912	5183								7691	11525		
1040 x 832	969	1304	1881	2560	3988	5283								7840	11749		
1060 x 848	987	1328	1917	2609	4064	5384								7990	11973		
1080 x 864	1004	1353	1952	2657	4140	5485								8139	12197		
1100 x 880	1022	1377	1988	2706	4216	5586								8288	12421		
1120 x 896	1040	1402	2024	2754	4292	5687								8438	12645		
1140 x 912	1058	1426	2059	2803	4368	5787								8587	12869		
1160 x 928	1076	1451	2095	2851	4444	5888								8737	13093		
1180 x 944	1094	1475	2130	2899	4520	5989								8886	13317		
1200 x 960	1112	1500	2166	2948	4596	6090								9035	13541		
1220 x 976	1130	1524	2201	2996	4672	6191								9185	13765		
1240 x 992	1148	1549	2237	3045	4748	6291								9334	13989		
1260 x 1008	1166	1573	2272	3093	4824	6392								9483	14213		
1280 x 1024	1184	1598	2308	3142	4900	6493								9633	14437		
1300 x 1040	1202	1623	2343	3190	4976	6594								9782	14660		
1320 x 1056	1220	1647	2379	3238	5052	6695								9932	14884		
1340 x 1072	1238	1672	2415	3287	5128	6796								10081	15108		
1360 x 1088	1256	1696	2450	3335	5204	6896								10230	15332		
1380 x 1104	1274	1721	2486	3384	5280	6997								10380	15556		
1400 x 1120	1292	1745	2521	3432	5356	7098								10529	15780		
1420 x 1136	1310	1770	2557	3481	5432	7199								10678	16004		
1440 x 1152	1328	1794	2592	3529	5508	7300								10828	16228		
1460 x 1168	1346	1819	2628	3578	5584	7400								10977	16452		
1480 x 1184	1364	1843	2663	3626	5660	7501								11126	16676		
1500 x 1200	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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 1.11 \times W - 36.79 \text{ (minimum } W \sim 80 \text{ mm)}$$

W(H), mm

$$W = (H + 36.79)/1.11 \text{ (minimum } H \sim 53 \text{ mm)}$$



8 mm Megapixel lens

Banner model: LCF08LEVMP (p/n 97346)

Evetar model: MV118FM08C

1/1.8-inch format, 27mm filter, min f/1.4, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 0.82 \times W - 23.49 \text{ (minimum } W \sim 83 \text{ mm)}$$

W(H), mm

$$W = (H + 23.49)/0.82 \text{ (minimum } H \sim 45 \text{ mm)}$$



12 mm Megapixel lens

Banner model: LCF12LEVMP (p/n 97347)

Evetar model: MV23FM12C

2/3-inch format, 27 mm filter, minimum f/1.6, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 0.56 \times W - 18.43 \text{ (minimum } W \sim 115 \text{ mm)}$$

W(H), mm

$$W = (H + 18.43)/0.56 \text{ (minimum } H \sim 47 \text{ mm)}$$



16 mm Megapixel lens

Banner model: LCF16LEVMP (p/n 97348)

Evetar model: MV23FM16CR1

2/3-inch format, 27 mm filter, minimum f/1.6, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 0.41 \times W - 17.16 \text{ (minimum } W \sim 162 \text{ mm)}$$

W(H), mm

$$W = (H + 17.16)/0.41 \text{ (minimum } H \sim 51 \text{ mm)}$$



25 mm Megapixel lens

Banner model: LCF25LEVMP (p/n 97349)

Evetar model: MV23FM25C

2/3-inch format, 27 mm filter, minimum f/1.8, fits with either the VELC60 or VELC85 lens cover

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, fits with either the VELC60 or VELC85 lens cover

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, fits with VELC85 lens cover

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, does not fit with a sealed lens cover

H(W), mm

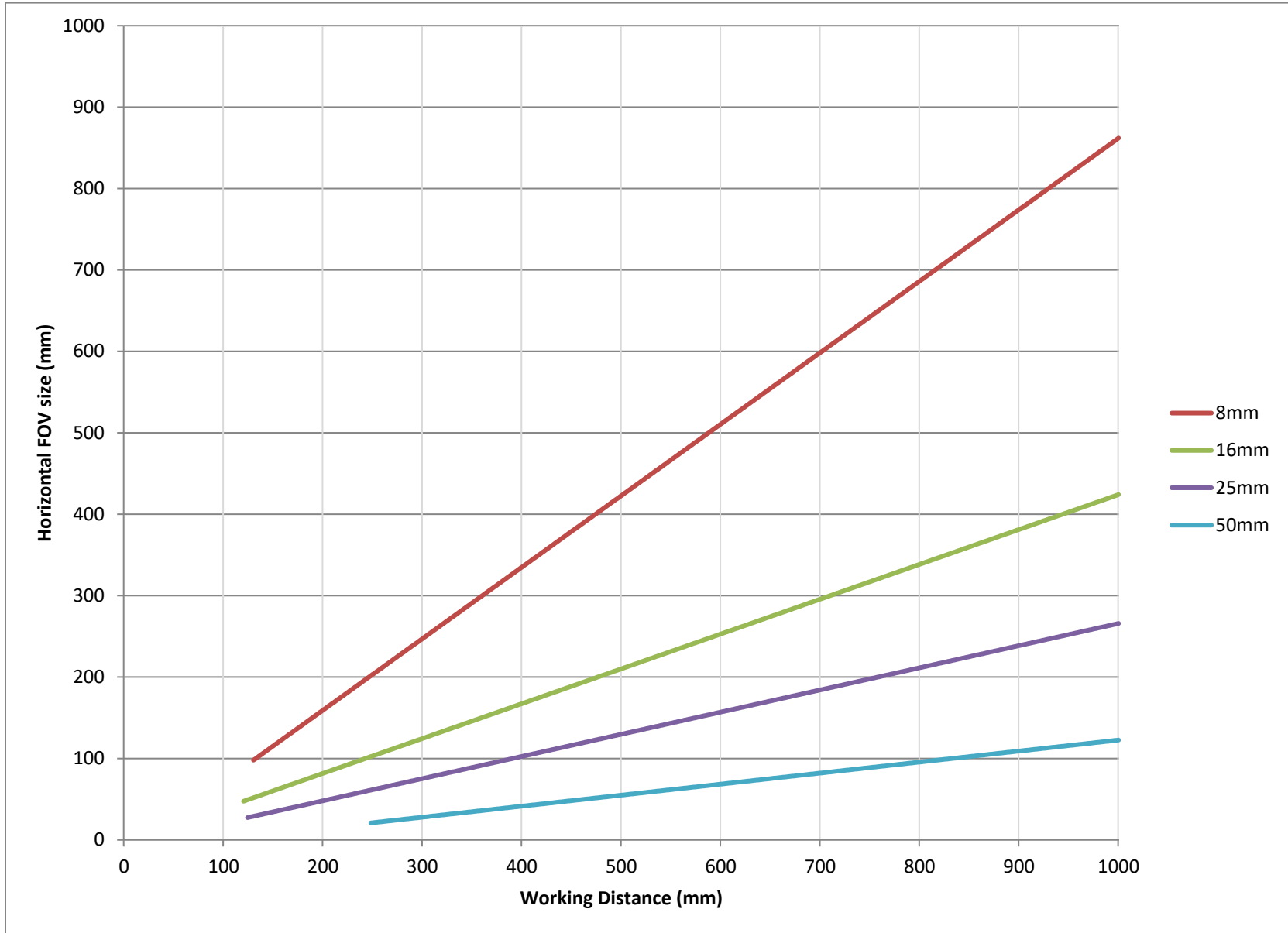
$H = 0.089 \times W - 9.18$ (minimum $W \sim 610$ mm)

W(H), mm

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



Tamron C-mount Lenses on 1.3MP VE Series



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		47 x 38		27 x 22		20 x 16	
	@ 130mm		@ 120mm		@ 124mm		@ 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 @ 130mm	47 x 38 @ 120mm	27 x 22 @ 124mm	20 x 16 @ 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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 0.88 \times W - 16.21 \text{ (minimum } W \sim 130 \text{ mm)}$$

W(H), mm

$$W = (H + 16.21)/0.88 \text{ (minimum } H \sim 99 \text{ mm)}$$



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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 0.428 \times W - 3.81 \text{ (minimum } W \sim 120 \text{ mm)}$$

W(H), mm

$$W = (H + 3.81)/0.428 \text{ (minimum } H \sim 47 \text{ mm)}$$



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, fits with either the VELC60 or VELC85 lens cover

H(W), mm

$$H = 0.27 \times W - 6.33 \text{ (minimum } W \sim 124 \text{ mm)}$$

W(H), mm

$$W = (H + 6.33)/0.27 \text{ (minimum } H \sim 27 \text{ mm)}$$



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, fits with VELC85 lens cover

H(W), mm

$$H = 0.135 \times W - 12.64 \text{ (minimum } W \sim 248 \text{ mm)}$$

W(H), mm

$$W = (H + 12.64)/0.135 \text{ (minimum } H \sim 20 \text{ mm)}$$