

Vivitar®

AUTOMATIC TX
CLOSE-FOCUSING
ZOOM LENS
90_{MM}-230_{MM} f4.5

CLOSE-FOCUSING INSTRUCTIONS
LENS SPECIFICATIONS

Close-Focusing Operation

To photograph subjects between 43 cm (17") and 2 m (6.5') from your camera's film plane:

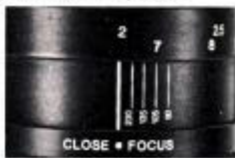
1 — Set the Zoom Ring (1) at the click-stop "90" position.

2 — For maximum reproduction during Close-Focus operation, turn the Focusing Ring (2) so the "2 m" marking aligns with the Distance Zoom Index Mark (3).

3 — Move the camera and/or subject until you obtain the image size and composition you want.

4 — Focus by turning the Zoom Ring between the click-stop "90" position and the "CLOSE • FOCUS" position until the subject appears sharpest in your camera viewfinder.

5 — For maximum resolution when photographing in the Close-Focusing mode, the lens should be stopped down to f16 or f22.



Helpful Hints for Close-Focusing Operation

1 — *Bracket* — shoot several pictures of the same subject at different exposures; exposure in close-up photography is critical. Under- and over-expose by a half to a full stop as well as shooting at "correct" exposure. This *insurance* is well worth a few pennies in film.

2 — Use a *tripod* or other *firm support* — slight movements and vibrations can ruin a great close-up photo. If, for some reason, a support can't be used, shoot the photo at the fastest possible shutter speed lighting conditions will allow.

3 — Use a *cable release* — the slight movement of your finger pressing the shutter release can cause movement of your camera (even when your camera is mounted on a tripod). After you arrange the photo, make all camera adjustments, and advance the film, wait a moment — then shoot. If your camera has a *self-timer*, use it for movement-free camera operation when a cable release is not available.

Specifications

Optical Construction (Elements/Groups): 12/9

Angles of Acceptance: 27°-12°

Aperture Range: 14.5-22

Minimum Focusing Distance from Film Plane:

2 m (6.5') Telephoto Mode

43 cm (17") Close-Focus Mode

Maximum Reproduction Ratio: 1:4

Zoom Ratio: 2.6:1

Length at ∞: 164 mm (6.5")

Maximum Barrel Diameter: 68 mm (2.7")

Weight: 800g (28.2 oz)

Accessory Size: Ø62mm

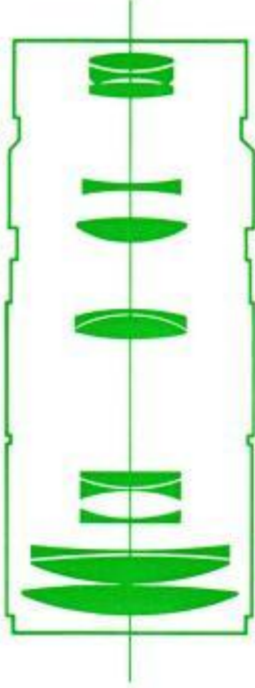
Lens Cap Size: 65mm

Lens Coating: MC (Multicoating)

Specifications subject to change without notice.

Notes

Depth of Field Tables



90mm

$\frac{h}{l}$	4.5	5.0	5.5	6	11	16	22
8	7.8% ~ 8.4°	7.7% ~ 8.3%	7.5% ~ 8.1%	7.5% ~ 8.1%	7.3% ~ 8.1%	6.1% ~ 9.4%	6.8° ~ 9.1%
10	9.6% ~ 10.5%	9.4% ~ 10.8°	9.2° ~ 10.3%	9.2° ~ 10.3%	8.9% ~ 11.5°	8.5% ~ 12.2°	8.0° ~ 13.4°
15	13.1% ~ 16.3°	13.8° ~ 16.6°	13.3° ~ 17.4°	13.3° ~ 17.4°	12.8° ~ 18.5°	11.1% ~ 20.6°	10.1% ~ 23.1%
20	18.2° ~ 22.3°	17.9° ~ 22.1%	16.1% ~ 24.5°	16.1% ~ 24.5°	16.0° ~ 24.7°	14.8° ~ 31.4°	13.4° ~ 35.9°
30	26.0° ~ 35.5°	25.3° ~ 37.0°	23.7° ~ 41.2°	23.7° ~ 41.2°	21.1% ~ 47.1%	19.6° ~ 65.6°	17.2° ~ 118.0°
50	40.0° ~ 67.0°	38.0° ~ 73.0°	34.0° ~ 81.0°	34.0° ~ 81.0°	31.0° ~ 137.0°	26.0° ~ 516.0°	22.0° ~ ∞
100	66.0° ~ 203.0°	61.0° ~ 272.0°	53.0° ~ ∞	53.0° ~ ∞	45.0° ~ ∞	36.0° ~ ∞	29.0° ~ ∞
∞	157.0° ~ ∞	150.0° ~ ∞	113.0° ~ ∞	113.0° ~ ∞	81.0° ~ ∞	55.0° ~ ∞	43.0° ~ ∞

$\frac{h}{l}$	4.5	5.0	5.5	6	11	16	22
2.5	2.4% ~ 2.61	2.3% ~ 2.64	2.3% ~ 2.70	2.3% ~ 2.70	2.27° ~ 2.78	2.18° ~ 2.93	2.08° ~ 3.14
5.0	4.6% ~ 5.45	4.5% ~ 5.58	4.35° ~ 5.87	4.35° ~ 5.87	4.15° ~ 6.28	3.86° ~ 7.11	3.55° ~ 8.44
7.5	6.2% ~ 7.52	6.1% ~ 8.15	5.80° ~ 8.83	5.80° ~ 8.83	5.45° ~ 9.79	4.95° ~ 11.96	4.48° ~ 16.29
10.0	8.5% ~ 12.00	8.20° ~ 12.62	7.71° ~ 14.21	7.71° ~ 14.21	7.11° ~ 16.88	6.28° ~ 24.55	5.51° ~ 34.06
15.0	12.00° ~ 20.00	11.44° ~ 21.77	10.38° ~ 27.90	10.38° ~ 27.90	9.31° ~ 38.57	7.94° ~ 135.00	6.75° ~ ∞
20.0	20.00° ~ 60.00	18.69° ~ 39.41	15.88° ~ 270.00	15.88° ~ 270.00	13.50° ~ ∞	10.80° ~ ∞	8.71° ~ ∞
30.0	27.27° ~ 300.00	24.55° ~ ∞	20.15° ~ ∞	20.15° ~ ∞	16.46° ~ ∞	12.62° ~ ∞	9.85° ~ ∞
∞	60.00° ~ ∞	48.71° ~ ∞	33.75° ~ ∞	33.75° ~ ∞	24.55° ~ ∞	16.88° ~ ∞	12.27° ~ ∞

105mm

Rc	f	4.5	5.8	8	11	16	22
8		7.9% ~ 8.3°	7.8% ~ 8.3%	7.7% ~ 8.5%	7.9% ~ 8.7%	7.7% ~ 8.11%	6.11% ~ 9.4%
10		9.7% ~ 10.4%	9.8% ~ 10.5%	9.4% ~ 10.8%	9.7% ~ 11.0°	9.10° ~ 11.6%	8.9% ~ 12.2%
15		14.2° ~ 15.11°	14.0° ~ 16.1°	13.8° ~ 16.8°	13.2° ~ 17.5°	12.6° ~ 18.9°	11.9° ~ 20.8°
20		18.7° ~ 21.7°	18.4° ~ 22.0°	17.8° ~ 23.1°	18.11° ~ 24.8°	15.10° ~ 27.3°	14.8° ~ 31.6°
30		26.11° ~ 33.8°	26.4° ~ 34.10°	25.0° ~ 37.6°	23.6° ~ 41.4°	21.8° ~ 50.0°	19.5° ~ 68.0°
50		42.0° ~ 61.0°	41.0° ~ 65.0°	38.0° ~ 75.0°	34.0° ~ 92.0°	30.0° ~ 149.0°	26.0° ~ 170.0°
100		73.0° ~ 160.0°	68.0° ~ 187.0°	60.0° ~ 297.0°	52.0° ~ ∞	43.0° ~ ∞	30.0° ~ ∞
∞		268.0° ~ ∞	215.0° ~ ∞	151.0° ~ ∞	110.0° ~ ∞	75.0° ~ ∞	55.0° ~ ∞

m	f	4.5	5.8	8	11	16	22
2.5		2.43 ~ 2.58	2.41 ~ 2.60	2.37 ~ 2.64	2.33 ~ 2.70	2.25 ~ 2.81	2.17 ~ 2.94
5.0		4.71 ~ 5.33	4.65 ~ 5.41	4.51 ~ 5.61	4.35 ~ 5.88	4.11 ~ 6.39	3.85 ~ 7.14
7.5		6.43 ~ 7.88	6.33 ~ 7.84	6.07 ~ 8.26	5.79 ~ 8.88	5.36 ~ 10.07	4.93 ~ 12.05
10.0		8.91 ~ 11.40	8.68 ~ 11.80	8.21 ~ 12.78	7.70 ~ 14.27	6.97 ~ 17.71	6.26 ~ 24.92
15.0		12.67 ~ 18.37	12.21 ~ 19.44	11.31 ~ 22.27	10.35 ~ 27.27	9.07 ~ 43.24	7.90 ~ 147.00
30.0		21.94 ~ 47.42	20.59 ~ 55.26	18.15 ~ 86.47	15.81 ~ 294.00	13.81 ~ ∞	10.31 ~ ∞
50.0		31.01 ~ 128.95	28.38 ~ 210.00	23.94 ~ ∞	20.03 ~ ∞	15.74 ~ ∞	12.52 ~ ∞
∞		81.87 ~ ∞	65.83 ~ ∞	45.94 ~ ∞	33.41 ~ ∞	22.97 ~ ∞	18.70 ~ ∞

135mm

fl. / 1	4.5	5.8	8	11	16	22
8	7.03° ~ 8.14°	7.94° ~ 8.76°	7.9° ~ 8.34°	7.73° ~ 8.64°	7.63° ~ 8.56°	7.61° ~ 8.56°
16	9.34° ~ 10.24°	9.84° ~ 10.76°	9.74° ~ 10.5°	9.54° ~ 10.7°	9.34° ~ 10.56°	9.0° ~ 11.74°
18	14.6° ~ 15.6°	14.5° ~ 15.6°	14.2° ~ 15°	13.10° ~ 14.4°	13.3° ~ 17.0°	12.10° ~ 18.0°
28	19.2° ~ 21.0°	18.11° ~ 20.2°	18.6° ~ 21.9°	18.0° ~ 22.6°	17.3° ~ 23.10°	16.5° ~ 25.8°
38	26.0° ~ 32.0°	27.8° ~ 32.9°	26.9° ~ 34.0°	25.9° ~ 36.0°	24.0° ~ 40.0°	22.6° ~ 45.0°
58	45.0° ~ 58.0°	44.0° ~ 58.0°	42.0° ~ 53.0°	39.0° ~ 69.0°	36.0° ~ 84.0°	32.0° ~ 113.0°
100	82.0° ~ 129.0°	78.0° ~ 129.0°	71.0° ~ 161.0°	64.0° ~ 223.0°	55.0° ~ 507.0°	48.0° ~ ∞
∞	443.0° ~ ∞	358.0° ~ ∞	269.0° ~ ∞	181.0° ~ ∞	125.0° ~ ∞	91.0° ~ ∞

fl. / 1	4.5	5.8	8	11	16	22
2.5	2.45 ~ 2.55	2.44 ~ 2.56	2.42 ~ 2.59	2.39 ~ 2.62	2.35 ~ 2.68	2.29 ~ 2.75
5.0	4.82 ~ 5.19	4.78 ~ 5.24	4.69 ~ 5.35	4.58 ~ 5.50	4.42 ~ 5.76	4.23 ~ 6.11
7.8	6.65 ~ 7.38	6.58 ~ 7.48	6.41 ~ 7.71	6.21 ~ 8.02	5.91 ~ 8.58	5.58 ~ 9.28
10.8	9.31 ~ 10.80	9.16 ~ 11.02	8.94 ~ 11.52	8.47 ~ 12.23	7.79 ~ 13.58	7.34 ~ 15.68
16.0	13.50 ~ 16.88	13.18 ~ 17.41	12.53 ~ 18.69	11.80 ~ 20.59	10.75 ~ 24.80	9.72 ~ 32.64
36.0	24.55 ~ 38.57	23.58 ~ 41.47	21.58 ~ 49.59	19.44 ~ 65.88	16.76 ~ 102.94	14.38 ~ ∞
96.0	36.69 ~ 79.42	34.23 ~ 82.75	30.15 ~ 106.39	26.24 ~ 154.28	21.58 ~ ∞	17.79 ~ ∞
∞	125.00 ~ ∞	108.48 ~ ∞	75.94 ~ ∞	55.27 ~ ∞	37.97 ~ ∞	27.61 ~ ∞

180mm

fl. / f	4.5	5.8	8	11	16	22
8	7°11' ~ 8°1'	7°33' ~ 8°13'	7°16' ~ 8°13'	7°9' ~ 8°7'	7°8' ~ 8°3'	7°7' ~ 8°5'
16	9°33' ~ 10°13'	9°33' ~ 10°13'	9°54' ~ 10°23'	9°8' ~ 10°34'	9°53' ~ 10°53'	9°5' ~ 10°73'
18	14°8' ~ 15°36'	14°7' ~ 15°45'	14°8' ~ 15°8'	14°4' ~ 15°9'	14°8' ~ 16°0'	13°9' ~ 16°6'
20	19°4' ~ 20°8'	19°5' ~ 20°8'	19°2' ~ 20°11'	18°10' ~ 21°4'	18°4' ~ 22°0'	17°9' ~ 22°10'
30	28°11' ~ 31°7'	28°8' ~ 31°6'	28°1' ~ 32°2'	27°5' ~ 33°0'	26°5' ~ 34°8'	25°3' ~ 36°16'
50	47°8' ~ 53°0'	46°0' ~ 54°0'	45°0' ~ 56°0'	43°0' ~ 58°0'	41°0' ~ 65°0'	38°0' ~ 73°0'
100	89°0' ~ 115°0'	86°0' ~ 119°0'	82°0' ~ 129°0'	76°0' ~ 145°0'	69°0' ~ 182°0'	62°0' ~ 264°0'
∞	78°0' ~ ∞	633°0' ~ ∞	443°0' ~ ∞	322°0' ~ ∞	221°0' ~ ∞	161°0' ~ ∞

m / f	4.5	5.8	8	11	16	22
2.5	2.47 ~ 2.53	2.47 ~ 2.53	2.45 ~ 2.55	2.44 ~ 2.57	2.41 ~ 2.60	2.38 ~ 2.63
5.8	4.90 ~ 5.11	4.87 ~ 5.13	4.82 ~ 5.19	4.76 ~ 5.27	4.66 ~ 5.40	4.54 ~ 5.57
7.8	6.80 ~ 7.21	6.75 ~ 7.26	6.65 ~ 7.38	6.53 ~ 7.54	6.34 ~ 7.81	6.13 ~ 8.16
10.8	9.60 ~ 10.43	9.51 ~ 10.55	9.31 ~ 10.80	9.08 ~ 11.33	8.71 ~ 11.74	8.31 ~ 12.56
15.8	14.12 ~ 16.00	13.92 ~ 16.27	13.50 ~ 16.88	13.01 ~ 17.70	12.27 ~ 19.29	11.49 ~ 21.60
20.8	26.67 ~ 34.29	25.96 ~ 35.53	24.55 ~ 38.57	22.98 ~ 43.20	20.77 ~ 54.00	18.82 ~ 77.14
30.8	41.36 ~ 63.16	39.71 ~ 67.50	36.49 ~ 79.41	33.13 ~ 101.89	28.72 ~ 160.86	24.77 ~ ∞
∞	240.00 ~ ∞	150.86 ~ ∞	125.00 ~ ∞	98.18 ~ ∞	67.50 ~ ∞	49.09 ~ ∞

200mm

h	f	4.5	5.6	8	11	16	22
8		7.11% ~ 8.7%	7.11% ~ 8.7%	7.10% ~ 8.1%	7.10% ~ 8.1%	7.9%	7.8%
10		9.10% ~ 10.1%	9.10% ~ 10.1%	9.9%	9.9%	9.7%	9.8%
15		14.9% ~ 15.3%	14.8%	14.7%	14.5%	14.3%	13.1%
20		19.7% ~ 20.5%	19.6%	19.3%	19.0%	18.8%	18.2%
30		29.0% ~ 30.1%	28.1%	28.5%	27.1%	27.0%	26.8%
50		48.0% ~ 52.9%	47.0%	48.0%	44.0%	42.0%	40.0%
100		91.0% ~ 111.0%	89.0%	85.0%	80.0%	73.0%	67.0%
∞		∞	∞	∞	∞	∞	∞

h	f	4.5	5.6	8	11	16	22
2.5		2.48 ~ 2.52	2.47 ~ 2.53	2.46 ~ 2.54	2.45 ~ 2.55	2.43 ~ 2.58	2.40 ~ 2.61
3.0		4.32 ~ 5.00	4.30 ~ 5.11	4.35 ~ 5.15	4.30 ~ 5.21	4.72 ~ 5.32	4.62 ~ 5.45
3.6		6.84 ~ 7.17	6.80 ~ 7.21	6.72 ~ 7.31	6.62 ~ 7.43	6.46 ~ 7.64	6.28 ~ 7.91
4.5		9.67 ~ 10.35	9.60 ~ 10.44	9.43 ~ 10.64	9.24 ~ 10.90	8.93 ~ 11.36	8.58 ~ 11.98
5.4		14.28 ~ 15.80	14.11 ~ 16.01	13.78 ~ 16.48	13.35 ~ 17.12	12.71 ~ 18.29	12.02 ~ 19.93
6.3		27.24 ~ 30.38	26.64 ~ 34.32	25.42 ~ 36.58	24.05 ~ 39.87	22.06 ~ 46.87	20.07 ~ 59.41
7.2		42.78 ~ 60.15	41.32 ~ 63.71	38.46 ~ 71.43	35.40 ~ 85.11	31.25 ~ 125.00	27.40 ~ 285.71
∞		∞	∞	∞	∞	∞	∞

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