

f- Stop -vs- Bellows Extension 250 mm *f*:3.4 Simple Lens

Wollaston Meniscus Lens

82mm Filter size

Using Aperture Cards (Waterhouse Stops) with a simple (single element) lens for portrait and close-up photography.

Unobstructed Lens Dia. – 73 (mm Ø)	focus @ Infinity	focus @ 10' (3m)	focus @ 40" (1m)
Actual bellows draw (Lens-to-Film, mm) – 250	250	270	325
Actual bellows draw (inches) -----	9.8	10.6	12.8

Standard <i>f</i> #'s	Aperture ø	Equivalent <i>f</i> #	Equivalent <i>f</i> #	Equivalent <i>f</i> #
Wide open	73 mm Ø	3.4	3.7	4.5
<i>f</i> 4.5	5 56 mm Ø	4.5	4.9	5.9
<i>f</i> 5.6	45 mm Ø	5.6	6.0	7.3
<i>f</i> 8	31 mm Ø	8.0	8.6	10.4
<i>f</i> 16	16 mm Ø	16.0	17.3	20.8
<i>f</i> 22	11 mm Ø	22.0	23.8	28.6
<i>f</i> 32	8 mm Ø	32.0	34.6	41.6
<i>f</i> 45	# 6 mm Ø	45.0	48.6	58.5

4x5 Format field of view:	48x60"	12x16"	(Lens to subject f.o.v.)
5x7 Format field of view:	60x82"	16x22"	
8x10 Format field of view:	85x108"	24x30"	

The above chart is a simplified method for estimating exposures without applying a "bellows extension factor".
Use with a simple (single element) barrel mounted, fixed diaphragm, shutterless lens.

Basic formula for *f*-stop with a simple lens:

...Divide the *measured* lens to film distance by the aperture diameter, = *f* stop at that *measured* lens to film distance.

Image circle at infinity: About 370mm (14.5") diameter