

**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.- <b>73</b> (mm Ø)	focus @ Infinity	focus @ 10' (3m)	focus @ 40" (1m)
Actual bellows draw (Lens-to-Film, mm) --- <b>250</b>	<b>250</b>	<b>270</b>	<b>325</b>
Actual bellows draw (inches) -----	9.8	10.6	12.8

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