CLOSE-UP PHOTOGRAPHY

USING THE LENS ONLY

The closest focusing range of Hasselblad lenses normally corresponds to an image scale of 0.1- 0.15 (subject field width 37 - 55 cm). A few lenses have a slightly larger maximum image scale.

The limit for the shortest focusing distance for a specific lens type is set with regard to both mechanical and image performance effects. A long focusing mechanism can be heavy and bulky. In addition, the lens performance is normally optimised for objects at infinity. At shorter focusing distances, the image quality will normally suffer unless the lens is optimised for such distances.

USING ADDITIONAL ACCESSORIES

For larger image scales than provided by the lens itself there are various options:

* Use an extension tube (or bellows extension)
* Use a teleconverter
* Combine above accessories in an optimal way

Extension tubes and bellows move the lens further from the film plane thus allowing photography at closer distances. Teleconverters increase the focal length of the lens thus allow covering a smaller area from the same distance. Both accessories require an increase in the exposure which need to be considered when the meter reading is made with a handheld meter. An adjustment is not necessary with a TTL metering system (meter prism finder or metering system in the 200 series cameras) since the light is measured through the accessory.

For best image quality, use Planar, Makro-Planar or Sonnar lens types especially for higher magnifications. While retro focus type lenses, such as the Distagons, are not designed for close-up photography, the newer types with FLE adjustment produce good image quality and can therefore be considered for general close-up work especially when the lens aperture is closed down. Close-up (Proxar) lenses also allow photography at closer distances but only with a reduction in image quality. They are therefore not recommended and are no longer made for Hasselblad.

The recommended combinations of lens and accessory for maximum image quality over the entire image area when photographing flat sujects are shown in the table below. Please remeber that the recommendations are based upon very strict requirements for image sharpness over the full film format. For some applications the use of wide-angle lenses close-up will provide intentional creative effects.

RECOMMENDED COMBINATIONS FOR HIGH IMAGE QUALITY IN CLOSE-UP PHOTOGRAPHY.
EFFECTIVE F-NUMBER f/16

FIELD WIDTH (IMAGE SCALE)	LENS TYPE	EXTENSION TUBE/BELLOWS	CONVERTER
275 mm 10 3/4 ins (0.2)	Planar 80	8	
	Planar 110	–	1.4XE
	Makro-Planar 120	No extension tube needed	
	Makro-Planar 120	–	1.4XE
	Sonnar 150	16E	
	Sonnar 180	16E	
183 mm 7 3/16 ins (0.3)	Planar 80	16E	
	Makro-Planar 120	16E	
	Makro-Planar 120	–	1.4XE
	Makro-Planar 120	(16E + 16E) *)	1.4XE
	Sonnar 150	32E	
	Sonnar 180	32E	

FIELD WIDTH (IMAGE SCALE)	LENS TYPE	EXTENSION TUBE/BELLOWS	CONVERTER
110 mm 4 5/16 ins (0.5)	Makro-Planar 120	32E	
	Makro-Planar 120	(32E + 16E) **)	1.4XE
55 mm 2 3/16 ins (1.0)	Makro-Planar 120	Bellows	
	Makro-Planar 120	(56E + 16E) ***)	1.4XE

*) Lens + 16E + 1.4XE + 16E
**) Lens + 32E + 1.4XE + 16E
***) Lens + 56E + 1.4XE + 16E

DEPTH-OF-FIELD

The depth-of-field (in mm) depends on the image scale only and is independent of the focal length of the taking lens. A wide-angle lens or a telephoto lens will give the same depth-of-field but of course different perspective effects. A short lens focal length will need a shorter distance to the object than a longer lens focal length possibly causing unpleasant (or intended) perspective effects.

In the table below, the depth-of-field is given for a number of image scales at two different accepted blur circle diameters. For high quality imaging a blur diameter of 0.03 mm (on the film) should be considered.

The following DOF (depth-of-field) figures are given for an effective (including extension) lens aperture of f/16:

FIELD WIDTH (IMAGE SCALE)	DOF (0.06 mm blur)	DOF (0.03 mm blur)
550 mm/1ft 9 1/2 ins (0.1)	211 mm/ 8 5/16 ins	106 mm/ 4 3/16 ins
275 mm/10 3/4 ins (0.2)	58 mm/ 2 1/4 ins	29 mm/ 1 1/8 ins
183 mm/7 3/16 ins (0.3)	28 mm/ 1 1/8 ins	14 mm/ 9/16 ins
110 mm/4 5/16 ins (0.5)	12 mm/ 1/2 ins	6 mm/ 1/4 ins
69 mm/2 11/16 ins (0.8)	6 mm/ 1/4 ins	3 mm/ 1/8 ins
55 mm/2 3/16 ins (1)	4 mm/ 3/16 ins	2 mm/ 1/16 ins

EXPOSURE COMPENSATION, OBJECT SIZE COVERED

With extension (lens focusing ring, extension tube or bellows), the exposure has to be compensated for. With a TTL metering system this is automatically made. When using an external light meter, compensation is necessary especially at larger image scales.
The table below shows the max-min field subject widths for the various extension tubes (and bellows together with a CFE 120). It also shows the min-max range of f-stop reduction.

FIELD WIDTH COVERAGE AND EXPOSURE COMPENSATION USING LENS EXTENSION TUBES

		FIELD WIDTH (MAX)			FIELD WIDTH (MIN)			F-STOP REDUCTION	
LENS	**EXT. TUBE**	**cm.**	**feet**	**inches**	**cm.**	**feet**	**inches**	**MIN.**	**MAX.**
CFE80	–				50	1	7.7	0	0.3
	8	56	1	10	26		10.2	0.2	0.5
	16E	28		11	18		7.1	0.4	0.7
	32E	14		5.5	11		4.3	0.8	1
	56E	8		3.1	6.9		2.7	1.3	1.5
CFi100	–				38	1	3	0.0	0.3
	8	70	2	3.6	25		9.8	0.2	0.5
	16E	35		1.8	18		7.1	0.4	0.7
	32E	17		6.7	12		4.7	0.7	1.0
	56E	10		3.9	7.9		3.1	1.2	1.4
CFE120	–				25		9.8	0.0	0.5
	8	83	2	8.7	19		7.5	0.2	0.7
	16E	42	1	4.5	15		5.9	0.3	0.8
	32E	21		8.3	11		4.3	0.6	1.0
	56E	12		4.7	8.0		3.1	1.0	1.4
	56E+32E	7.6		3	5.8		2.3	1.5	1.8
	BELLOWS	10		3.9	2.9		1.1	1.1	2.9
CFi150	–				39	1	3.4	0.0	0.5
	8	104	3	4.9	28		11.0	0.2	0.7
	16E	52	1	8.5	22		8.7	0.4	0.8
	32E	26		10.2	16		6.3	0.7	1.1
	56E	15		5.9	11		4.3	1.2	1.5
CFE180	–				36	1	2.2	0.0	0.6
	8	123	4	0.4	28		11.0	0.2	0.7
	16E	62	2	0.4	23		9.1	0.3	0.8
	32E	31	1	17			6.7	0.6	1.1
	56E	18		7.1	12		4.7	1.0	1.4
CFi250	–				43	1	4.9	0.0	0.6
	8	171	5	7.3	35	1	1.8	0.2	0.7
	16E	85	2	9.5	29		11.4	0.3	0.8
	32E	43	1	4.9	21		8.3	0.6	1.1
	56E	24		9.4	16		6.3	1.0	1.4
FE110	–				29		11.4	0.0	0.5
	16E	38	1	3.0	16		0.4	0.8	
	32E	19		7.5	11		4.3	0.7	1.1
	56E	11		4.3	7.9		3.1	1.1	1.5
FE60-120	–				50	1	7.7	0	0
@	16E	39	1	3.4	20		7.9	0.3	0.3
120 mm *)	32E	20		7.9	13		5.1	0.6	0.6

**) Other settings than 120 mm not recommended.*

HOW TO READ THE TABLES:

Example 1:

Q: You want to fill the frame with a subject approximately 30 x 30 cm in size but you don't want to use extension tubes. Which lens would be suitable?

A: Look in the FIELD WIDTH column under MIN for a figure that is equal to, or less than, 30. This figure should then correlate with a dash in the EXTENSION RING column (meaning that no extension ring to be used). Two lenses fit these particular criteria:
the CFE 120 (25 cm) and the FE110 (29 cm).

Example 2:

Q: You have a Makro-Planar 4/120 mm lens and two extension tubes; a 32E and a 56E. You want to know what areas could be adequately covered when the tubes are combined and whether there are any ranges where this lens/tube combination would not be suitable.

A:

32E + 56E combined coverage

a. Look in the LENS column for the appropriate lens group of figures (CFE 120 in this case).
b. Under the EXTENSION TUBE column find the required combination (32E+56E in this case).
c. Look across on that row to the FIELD WIDTH (MAX.and MIN.) headings where you will find 7.6 and 5.8 respectively. Areas that fall between 7.6 x 7.6 cm and 5.8 x 5.8 cm will therefore be adequately covered (a scale of almost 1:1 in the case of 5.8 x 5.8 cm).

Individual coverage

32E ONLY: In the EXTENSION TUBE row for 32E: for areas between 21 x 21 cm and 11 x 11 cm
56E ONLY: In the EXTENSION TUBE row for 56E: for areas between 12 x 12 cm and 8 x 8 cm
LENS ONLY: In the EXTENSION TUBE row for no extension tube: for areas between 25 x 25 cm and larger

Possible total coverage

There will be a slight gap in coverage between 7.6 x 7.6 cm and 8 x 8 cm as well as between 21 x 21 cm and 25 x 25 cm.