

Planar T* f/3.5—100 mm

The Planar T* f/3.5—100 mm lens is distinguished by outstanding freedom from distortion and image quality owing to optimum speed and focal length. This lens with Prontor CF shutter has been specially developed for the Hasselblad camera.

At full aperture and when stopped down moderately, the image quality of the Planar T* f/3.5—100 mm lens is superior to that of the 80 mm Planar lens. For this reason the lens is recommended as standard lens for photography where the demands for detail recognition and brilliance are high.

The excellent distortion correction is also of great importance for architectural photography and for all applications which require an exact reproduction of the geometry of the object (e. g. for surveying).

Number of lens elements:	5
Number of components:	4
f-number:	3.5
Focal length:	100.3 mm
Negative size:	56.5×56.5 mm
Angular field:	diagonal 43°, side 32°
Spectral range:	visible spectrum
f-stop scale:	3.5—4—5.6—8—11—16—22
Mount:	Prontor CF shutter
Filter mounting:	bayonet for Hasselblad series 60
Distance range:	∞ to 0.9 m
Position of entrance pupil:	32.9 mm behind the first lens vertex
Diameter of entrance pupil:	28.7 mm
Position of exit pupil:	42.6 mm in front of the last lens vertex
Diameter of exit pupil:	33.4 mm
Position of principal plane H:	42.2 mm behind the first lens vertex
Position of principal plane H':	27.1 mm in front of the last lens vertex
Distance between first and last lens vertex:	57.2 mm



Performance data: Planar T* CF/3.5—100 mm

1. MTF Diagrams

The image height u — reckoned from the image center — is entered in mm on the horizontal axis of the graph. The modulation transfer T (MTF = Modulation Transfer Factor) is entered on the vertical axis. Parameters of the graph are the spatial frequencies R in cycles (line pairs) per mm given at the top right hand above the diagrams.

The lowest spatial frequency corresponds to the upper pair of curves, the highest spatial frequency to the lower pair. Above each graph the f-number k is given for which the measurement was made. "White" light means that the measurement was made with a subject illumination having the approximate spectral distribution of daylight.

Unless otherwise indicated, the performance data refer to large object distances, for which normal photographic lenses are primarily used.

2. Relative illuminance

In this diagram the horizontal axis gives the image height u in mm and the vertical axis the relative illuminance E , both for full aperture and a moderately stopped-down lens. The values for E are determined taking into account vignetting and natural light decrease.

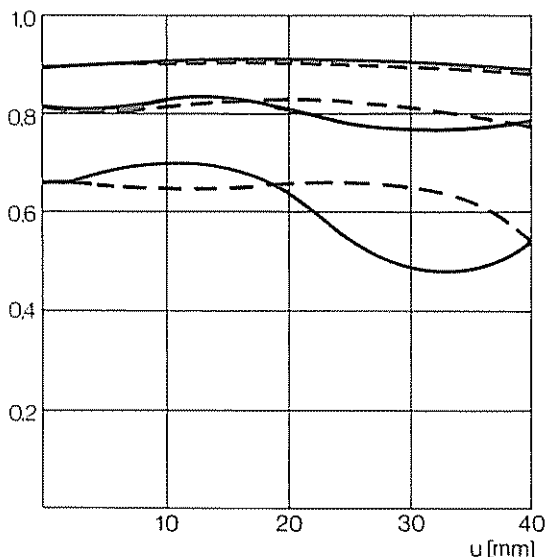
3. Distortion

Here again the image height u is entered on the horizontal axis in mm. The vertical axis gives the distortion V in % of the relevant image height. A positive value for V means that the actual image point is further from the image center than with perfectly distortion-free imaging (pincushion distortion); a negative V indicates barrel distortion.

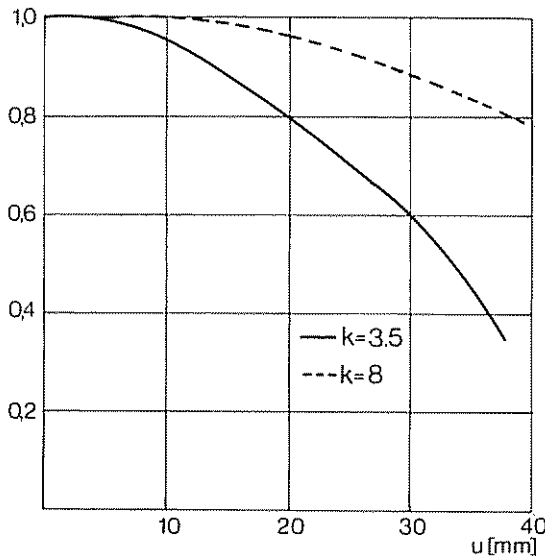
Modulation transfer T as a function of image height u
 Slit orientation tangential - - - -
 sagittal ———

White light
 Spatial frequencies $R = 10$ cycles/mm 20 cycles/mm
 40 cycles/mm

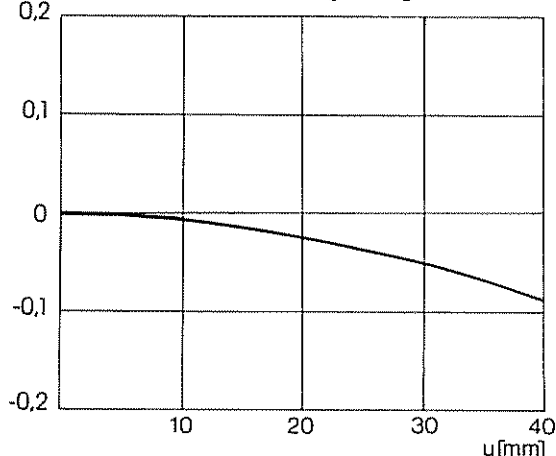
T f-number $k=8$



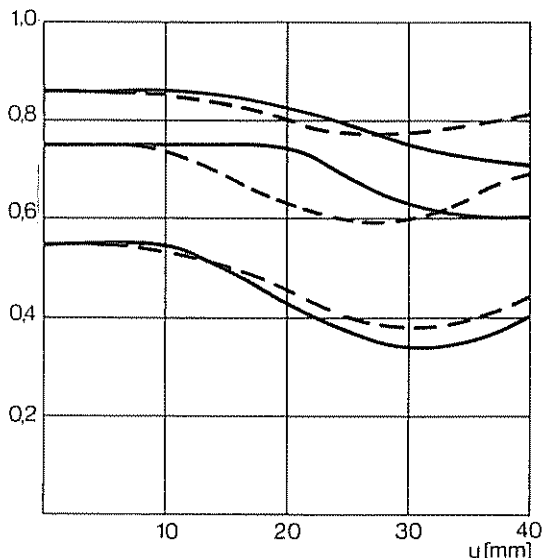
E Relative illuminance



V Distortion in % of image height u



T f-number $k=3.5$



Biogon T* f/4.5—38 mm

Because of the extremely short distance of the last lens vertex from the film plane (back focal distance), the Biogon lens cannot be used in the Hasselblad MK70 camera body. It is therefore assembled in its own special camera body, the MKWE.

Even at full aperture the Biogon T* f/4.5—38 mm lens produces pictures of outstanding sharpness and brilliance. Distortion aberration is virtually eliminated. Owing to the short focal length, there is such a large depth of focus that the fixed-focus adjustment can frequently be used.

The Biogon T* lens is particularly suitable for architectural and model photography, for interiors and for the recording of technical processes at close range. Whenever maximum image quality has top priority and subjects of this type are to be reproduced with a minimum of distortion, the Biogon lens is the best choice. For compactness and performance it cannot be beaten by any retrofocus system.

Number of lens elements:	8
Number of components:	5
f-number:	4.5
Focal length:	38.4 mm
Negative size:	56.5×56.5 mm
Angular field:	diagonal 90°, side 72°
Spectral range:	visible spectrum
f-stop scale:	4.5—5.6—8—11—16—22
Mount:	Prontor CF shutter mounted on MKWE Camera body
Filter mounting:	bayonet for Hasselblad series 60
Distance range:	∞ to 0.3 m
Position of entrance pupil:	21.7 mm behind the first lens vertex
Diameter of entrance pupil:	8.6 mm
Position of exit pupil:	21.6 mm in front of the last lens vertex
Diameter of exit pupil:	9.1 mm
Position of principal plane H:	23.5 mm behind the first lens vertex
Position of principal plane H':	19.9 mm in front of the last lens vertex
Distance between first and last lens vertex:	76.2 mm



Performance data: Biogon T* CF/4.5—38 mm

1. MTF Diagrams

The image height u — reckoned from the image center — is entered in mm on the horizontal axis of the graph. The modulation transfer T (MTF = Modulation Transfer Factor) is entered on the vertical axis. Parameters of the graph are the spatial frequencies R in cycles (line pairs) per mm given at the top right hand above the diagrams.

The lowest spatial frequency corresponds to the upper pair of curves, the highest spatial frequency to the lower pair. Above each graph the f-number k is given for which the measurement was made. "White" light means that the measurement was made with a subject illumination having the approximate spectral distribution of daylight.

Unless otherwise indicated, the performance data refer to large object distances, for which normal photographic lenses are primarily used.

2. Relative illuminance

In this diagram the horizontal axis gives the image height u in mm and the vertical axis the relative illuminance E , both for full aperture and a moderately stopped-down lens. The values for E are determined taking into account vignetting and natural light decrease.

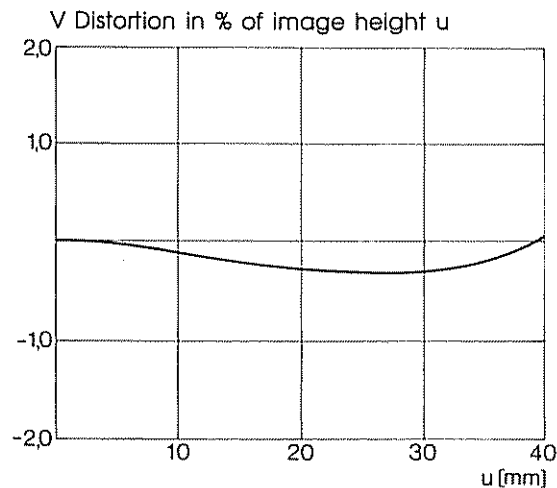
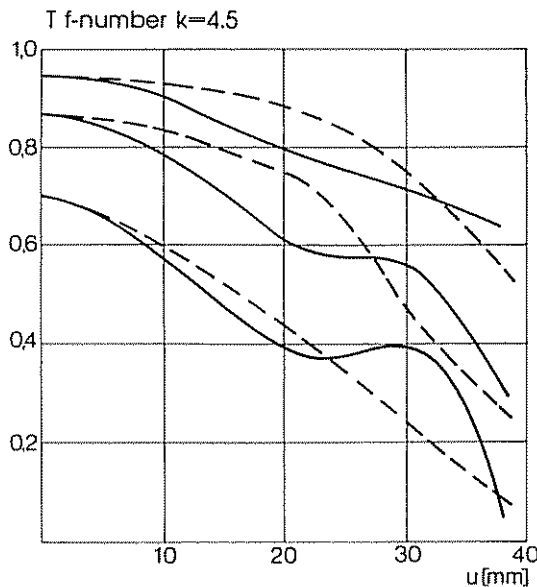
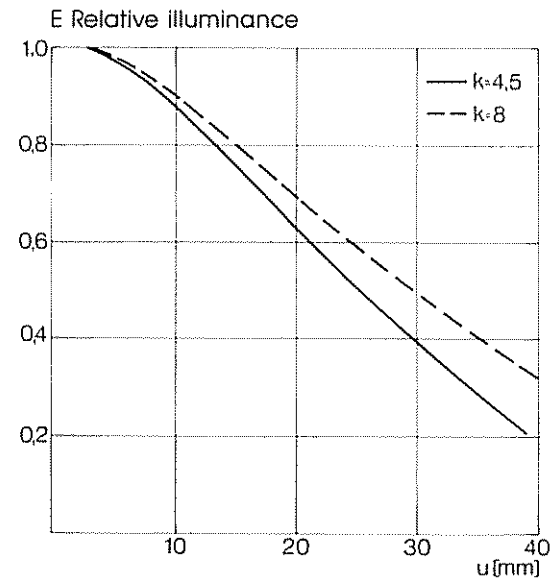
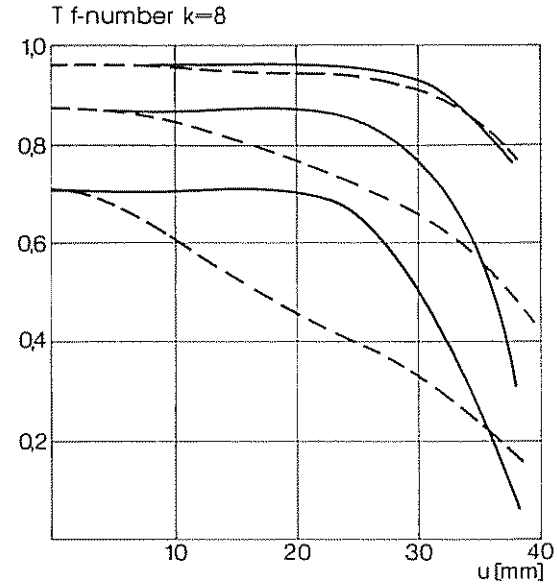
3. Distortion

Here again the image height u is entered on the horizontal axis in mm. The vertical axis gives the distortion V in % of the relevant image height. A positive value for V means that the actual image point is further from the image center than with perfectly distortion-free imaging (pincushion distortion); a negative V indicates barrel distortion.

Modulation transfer T as a function of image height u
 Slit orientation tangential -----
 sagittal —————

White light

Spatial frequencies $R = 10$ cycles/mm 20 cycles/mm
 40 cycles/mm



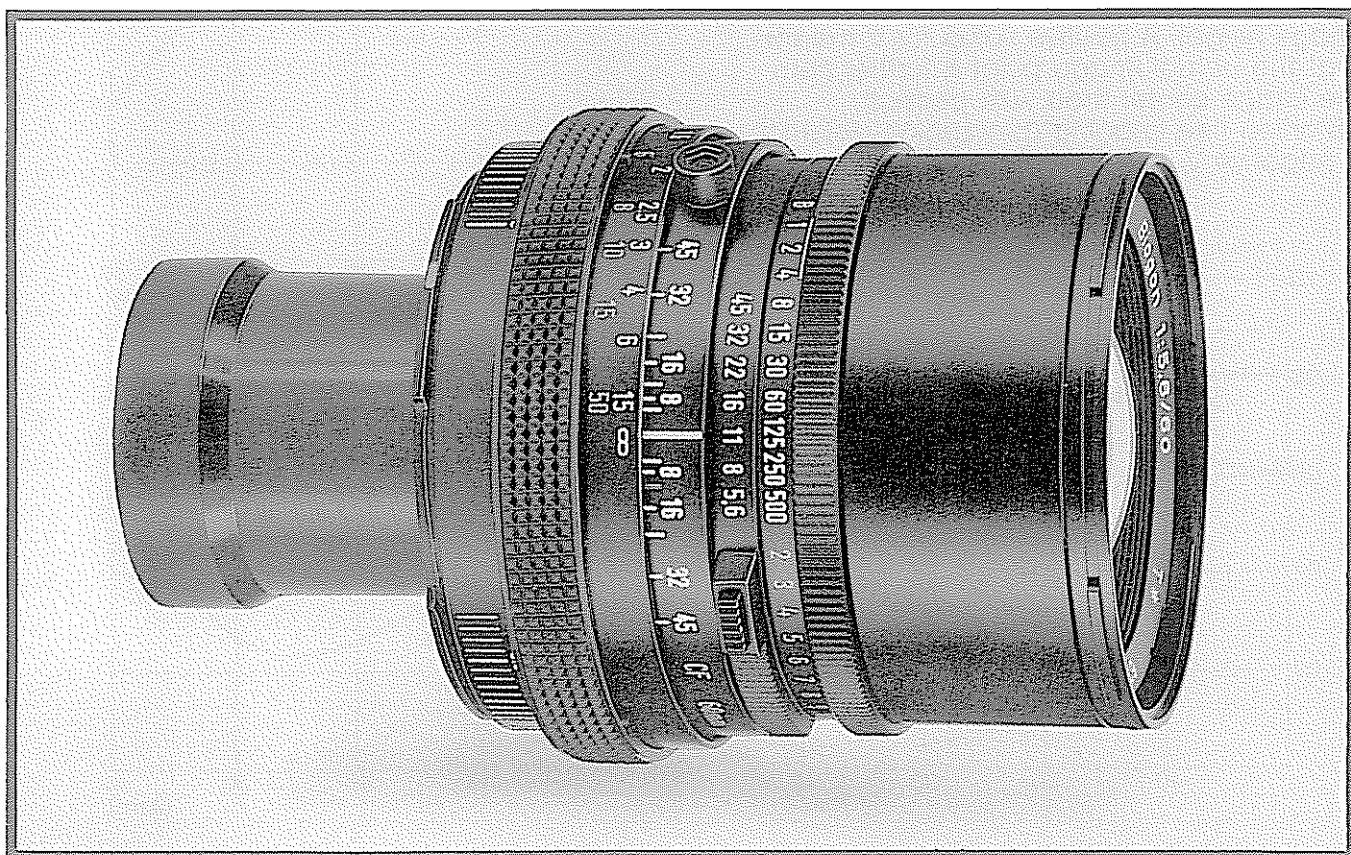
Biogon f/5.6—60 mm (only for reseau cameras)

The BIOGON f/5.6—60 mm is a special wide-angle lens which meets the stringent requirements of photogrammetric photography with regard to image quality and freedom from distortion. A 4 mm thick reseau plate with 25 etched reseau crosses at nominal distances of 10 mm which are maintained to within 0.005 mm, is provided for the correction of this lens.

The BIOGON f/5.6—60 mm lens in the "Hasselblad EL Data Camera" took part in the Apollo 11 lunar landing. This wide-angle lens is now used for normal photogrammetric purposes in the "Hasselblad MK 70" camera. Each lens is calibrated together with its camera body. The corresponding data are entered in the test report which is supplied with each camera.

The BIOGON f/5.6—60 mm cannot be used in normal Hasselblad cameras with reflex viewfinder.

Number of lens elements:	8
Number of components:	5
f-number:	5.6
Focal length:	61.1 mm
Negative size:	53×53 mm
Angular field:	diagonal 63°, side 47°
Spectral range:	visible spectrum
f-stop scale:	5.6—8—11—16—22—32—45
Mount:	Compur interchangeable shutter
Filter mounting:	adapter ring for Hasselblad series 63
Weight:	740 g
Distance range:	∞ to 0.9 m
Position of entrance pupil:	39.1 mm behind the first lens vertex
Diameter of entrance pupil:	10.9 mm
Position of exit pupil:	61.5 mm in front of the surface
Diameter of exit pupil:	11.0 mm
Position of principal plane H:	39.4 mm behind the first lens vertex
Position of principal plane H':	61.1 mm in front of the last surface of the reseau plate
Distance between first and last lens vertex:	125.5 mm



Performance data: Biogon CF/5.6—60 mm

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3. Distortion

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Modulation transfer T as a function of image height u
 Slit orientation tangential — — — —
 sagittal —————

White light
 Spatial frequencies $R = 10$ cycles/mm 20 cycles/mm
 40 cycles/mm

