

# VEO\_HJ Apo 4.5 / 90

For V38 Mounts

## Key Features

VEO\_HJ Apo 4.5 / 90 is a high-performance industrial lens optimized for large format area scan and line scan cameras with image circle diameters of 90 mm.

- V38 Mount
- 90 mm image circle
- Apo chromatic correction & low distortion
- 400 – 1000 nm broadband AR-coating

## Applications

- FPD inspection
- PCB inspection
- Web inspection
- Measurement systems
- Package sorting / logistic

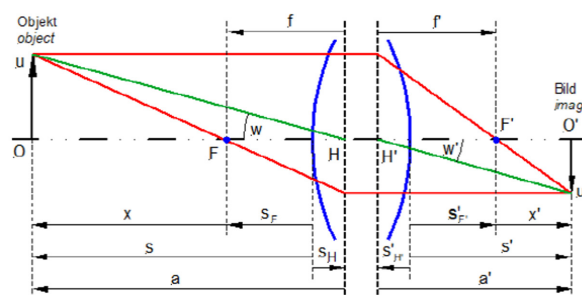
## Performance

Parameter	Specification	Remarks
Magnification range	$\times 0 - \times 0.5$	-
F/# range	F/4.5 ... F/64	-
Numerical aperture	0.11	Image plane
Max. sensor size [mm]	90	-
Focal length [mm]	90	-
Wavelength [nm]	400 – 1000	Visible – IR
Distortion [%]	< 0.2	-
Working distance [mm]	246 ... $\infty$	-
Total length [mm]	2466	0.04 $\times$
	1102	0.1 $\times$
	486	0.33 $\times$
Interface	V38 mount	-
Iris	Changeable	-
Weight [g]	134	-
Storage temperature [°C]	-25 ~ 70	-
Filter thread [mm]	M37 * 0.75 pitch	-



## Optical Parameters

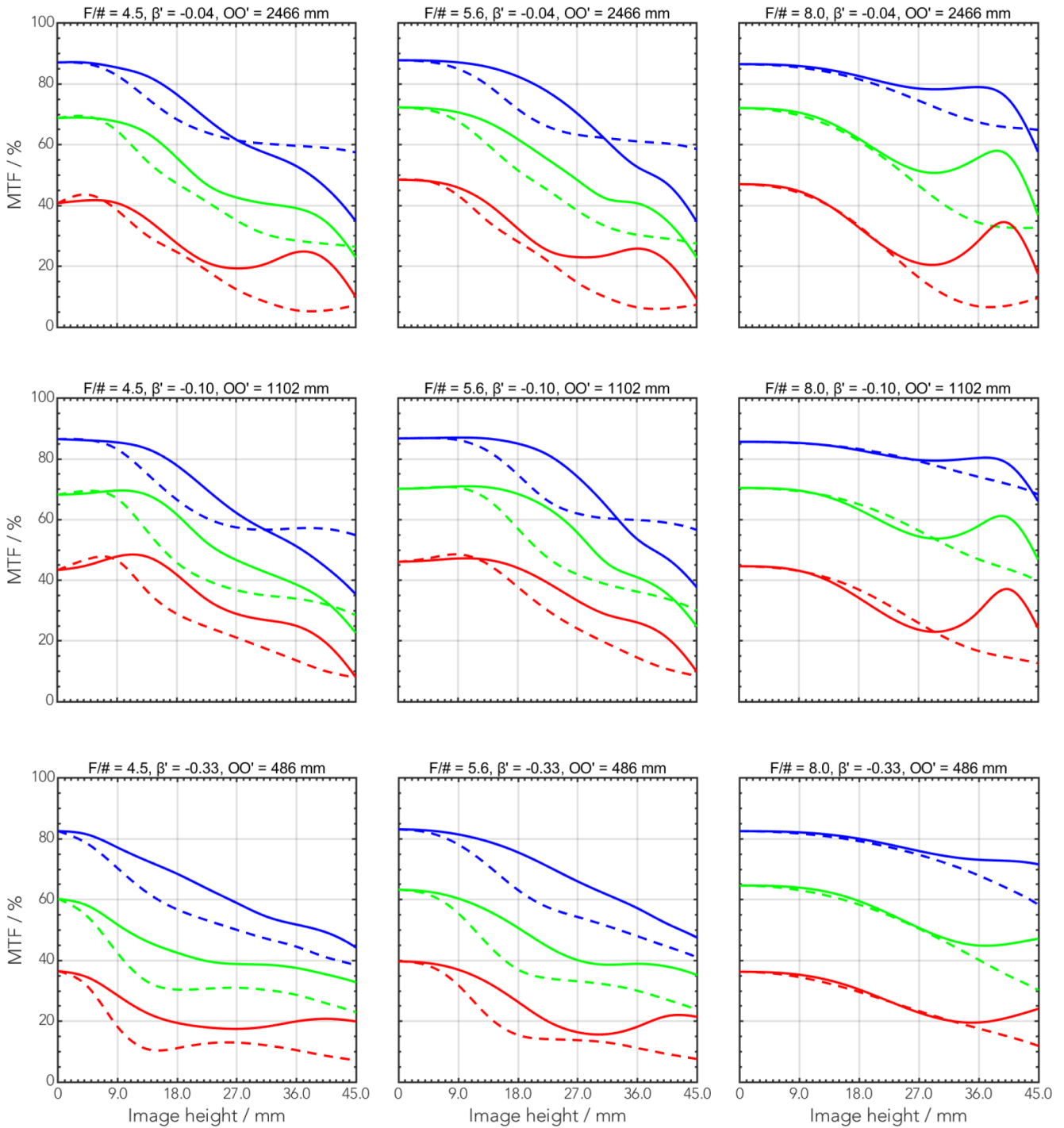
Contents	Parameter	Value
Chief Ray Angle (Max.) in object plane	CRA[° ]	52°
Effective focal length	f'eff [mm]	91.19
Front focal length	SF [mm]	-67.47
Back focal length	S'F' [mm]	67.77
Principal plane distance	HH' [mm]	-3.62
Pupil magnification	$\beta'P$	1.01
Entrance pupil position	SEP [mm]	22.44
Exit pupil position	S'AP [mm]	-24.72
Vertex width	$\Sigma d$ [mm]	43.52



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## MTF

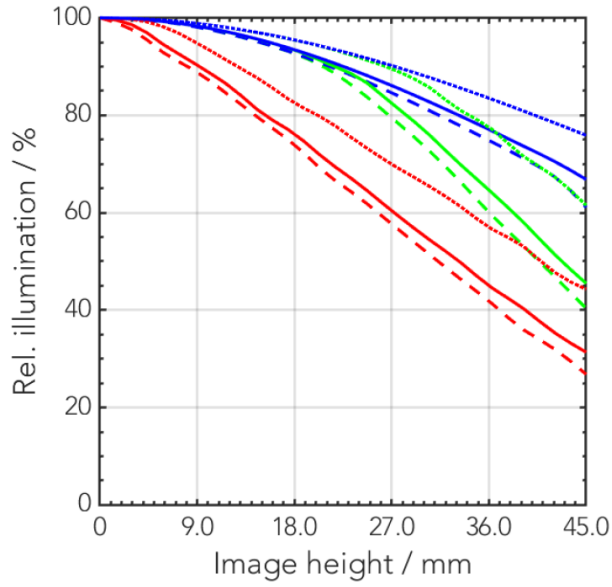


— 20 LP/mm, radial  
- - 20 LP/mm, tangential

— 40 LP/mm, radial  
- - 40 LP/mm, tangential

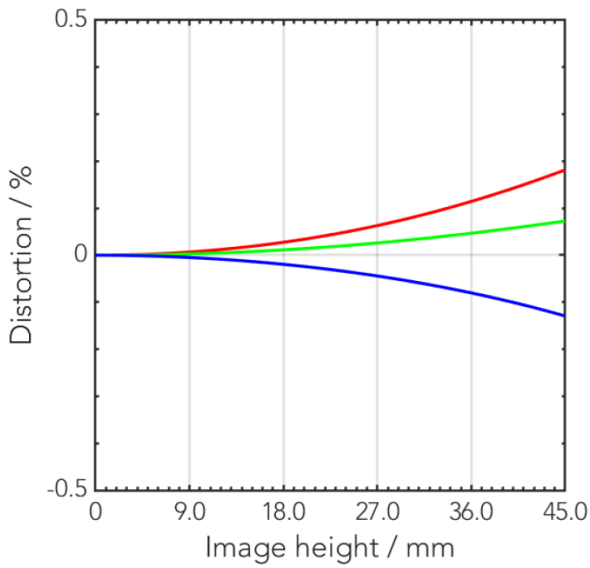
— 80 LP/mm, radial  
- - 80 LP/mm, tangential

## Relative Illumination



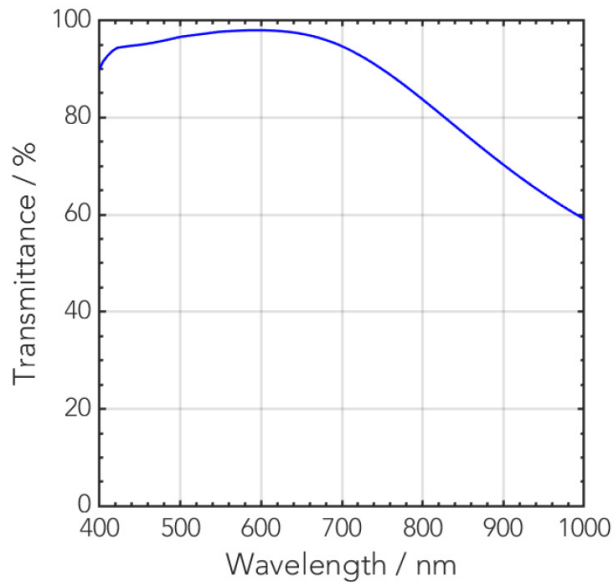
- - F/# = 4.5,  $\beta = -0.04$
- - F/# = 5.6,  $\beta = -0.04$
- - F/# = 8.0,  $\beta = -0.04$
- F/# = 4.5,  $\beta = -0.10$
- F/# = 5.6,  $\beta = -0.10$
- F/# = 8.0,  $\beta = -0.10$
- ... F/# = 4.5,  $\beta = -0.33$
- ... F/# = 5.6,  $\beta = -0.33$
- ... F/# = 8.0,  $\beta = -0.33$

## Distortion



- $\beta' = -0.04$
- $\beta' = -0.10$
- $\beta' = -0.33$

## Transmittance vs. Wavelength



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## Dimensions

Unit: mm

