

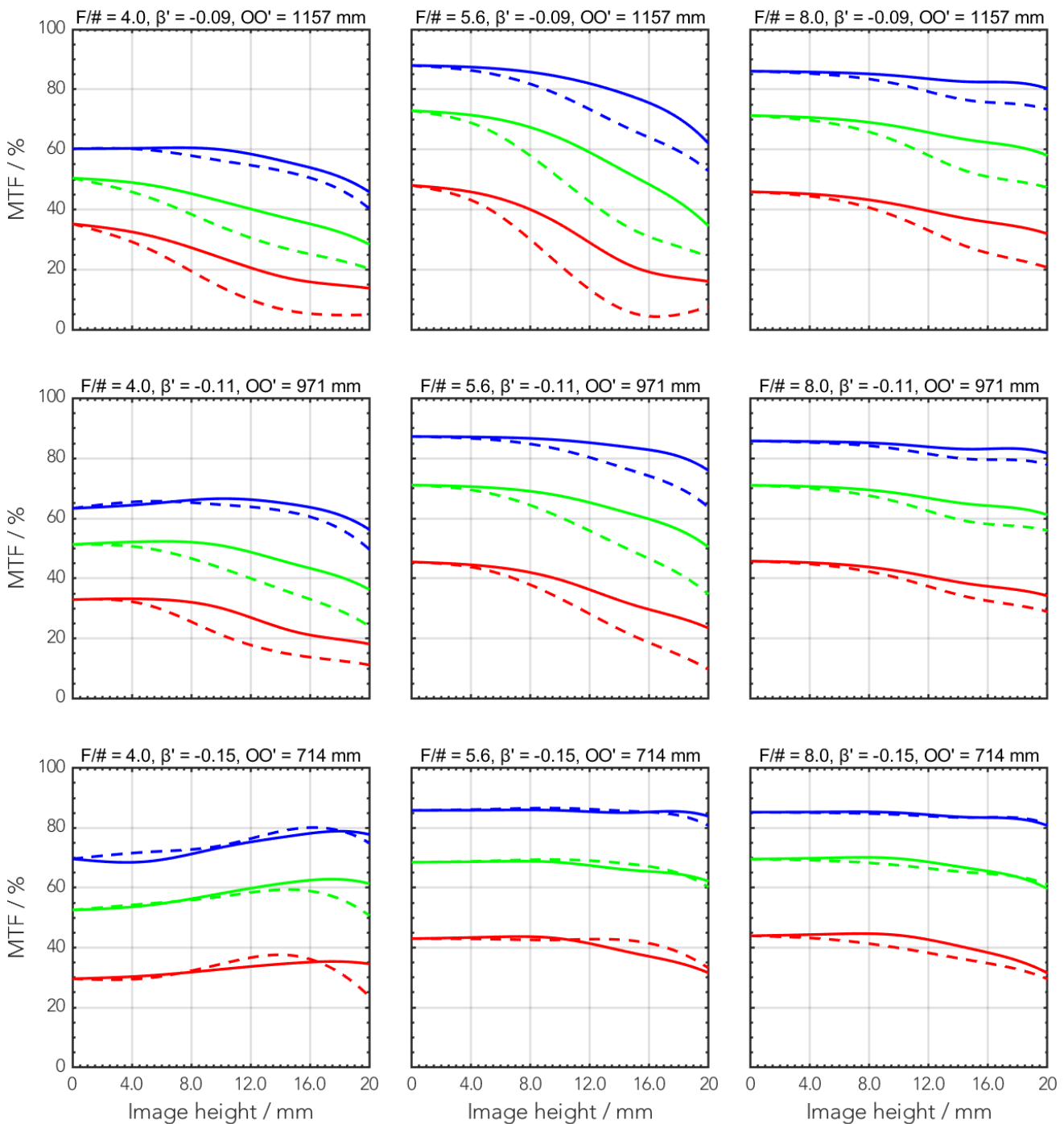
This lens combines an approved Schneider Lens and one of Optotunes Focus Tunable Lenses EL-16-40-TC. It comes in four versions for C-Mount and TFL-Mount, each Mount for two different working distances. Short Version (SD) is suitable from appr. 320mm to 900mm working distance, Long Version (LD) is optimized for applications at appr. 400mm and farer distances.

| Key features   | Applications  |
|--|---|
| <ul style="list-style-type: none"> <li>• Focus tunable liquid lens included</li> <li>• Large working distance range</li> <li>• Fast focus within milliseconds</li> <li>• Large image circle</li> </ul> | <ul style="list-style-type: none"> <li>• Machine Vision</li> <li>• Package sorting / logistic</li> <li>• Bar code reading</li> <li>• Quality control</li> </ul> |

| Technical specifications                           |  |
|--|--|
| Type [liquid lens focus, short distance]           | TFL-LF-SD                              |
| ID [liquid lens focus, short distance]             | 1102610                                |
| Interface  | TFL-Mount                              |
| Focal length [mm]                                  | 80                                     |
| F/# range  | F/4 ... F/45                           |
| Numerical aperture [object   image]                | -   0.09                               |
| Max. sensor size [mm]                              | 40                                     |
| Max. angle of view [°]                             | 26                                     |
| Rec. magnification range                           | -0.25 ... -0.08                        |
| Rec. working distance range [mm]                   | 318 ... 897                            |
| Min- working distance without extension tubes [mm] | 278                                    |
| Filter thread [mm]                                 | M37 x 0.75                             |
| Storage temperature [°C]                           | -25 ... +70                            |
| Net. weight [standard] [g]                         | 243                                    |
| Additional info                                    | Data dependent on liquid lens settings |
| f'eff [mm]   | 71.52 ... 86.99                        |
| SF [mm]  | -46.40 ... -67.73                      |
| S'F' [mm]  | 49.52 ... 60.65                        |
| HH' [mm]   | -1.43 ... 0.08                         |
| β'P  | 1.16 ... 1.05                          |
| SEP [mm]   | 14.74                                  |
| S'AP [mm]  | -34.14 ... -31.12                      |
| Σd [mm]  | 50.73                                  |

## MTF charts

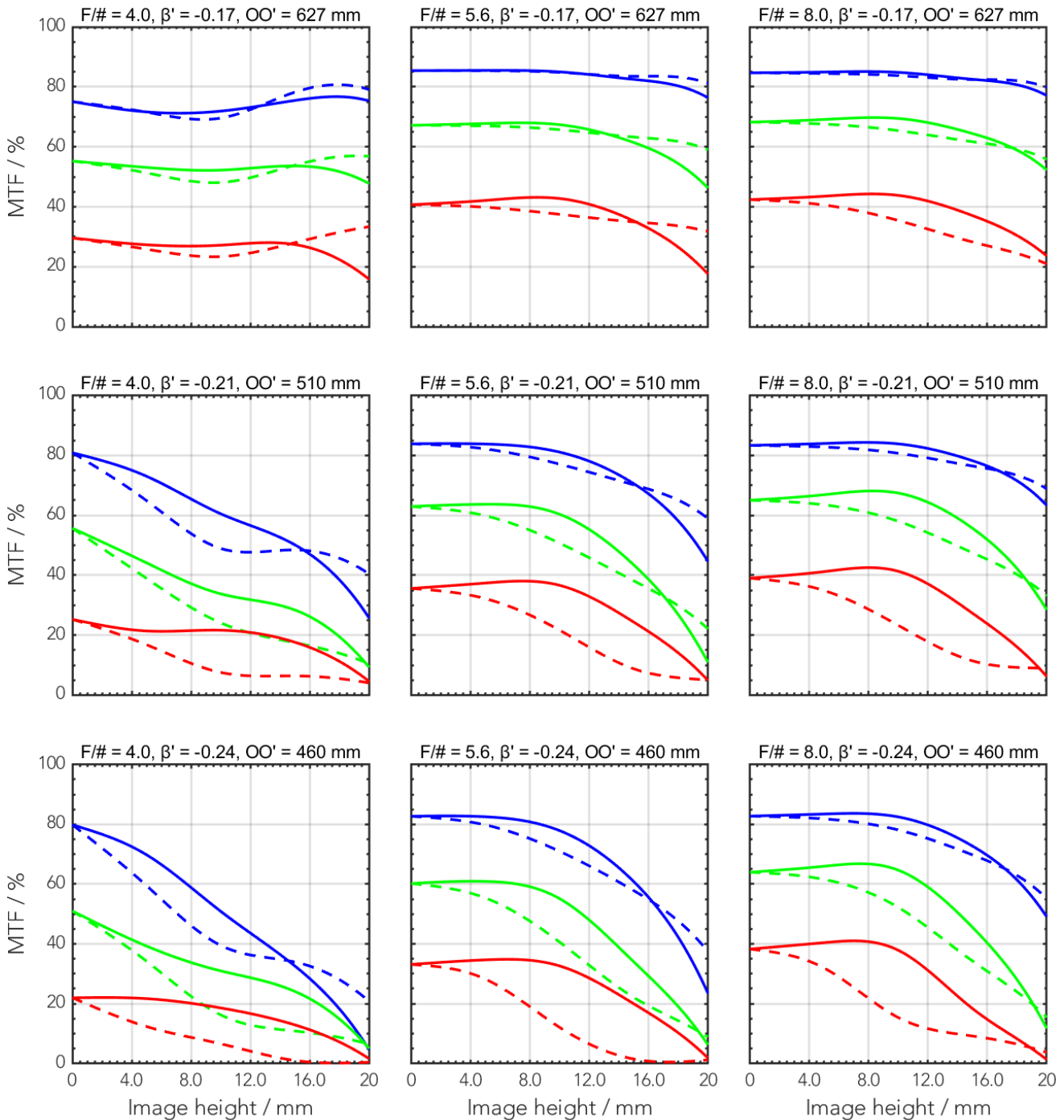
| Spectrum name    | VIS |     |     |     |     |     |
|------------------|-----|-----|-----|-----|-----|-----|
| Wavelengths [nm] | 425 | 475 | 525 | 575 | 625 | 675 |
| Rel. weights [%] | 8   | 16  | 23  | 22  | 19  | 13  |



— 20 LP/mm, radial      — 40 LP/mm, radial      — 80 LP/mm, radial  
- - - 20 LP/mm, tangential      - - - 40 LP/mm, tangential      - - - 80 LP/mm, tangential

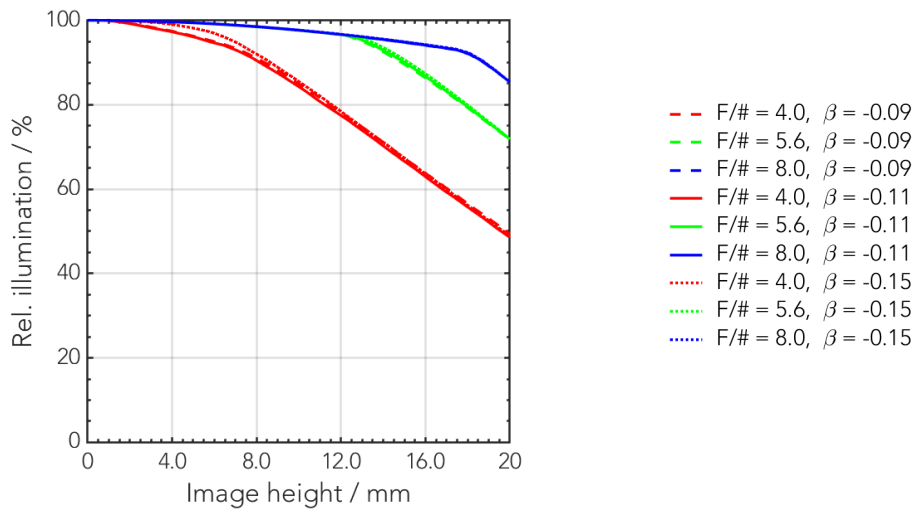
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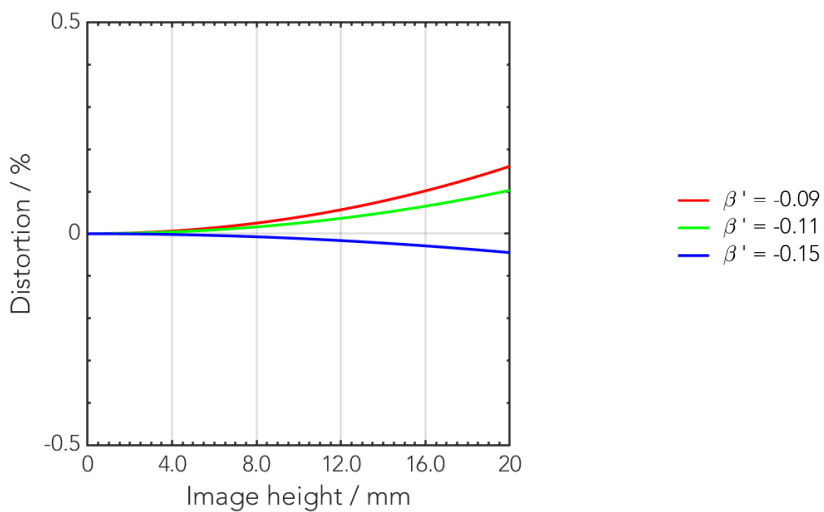


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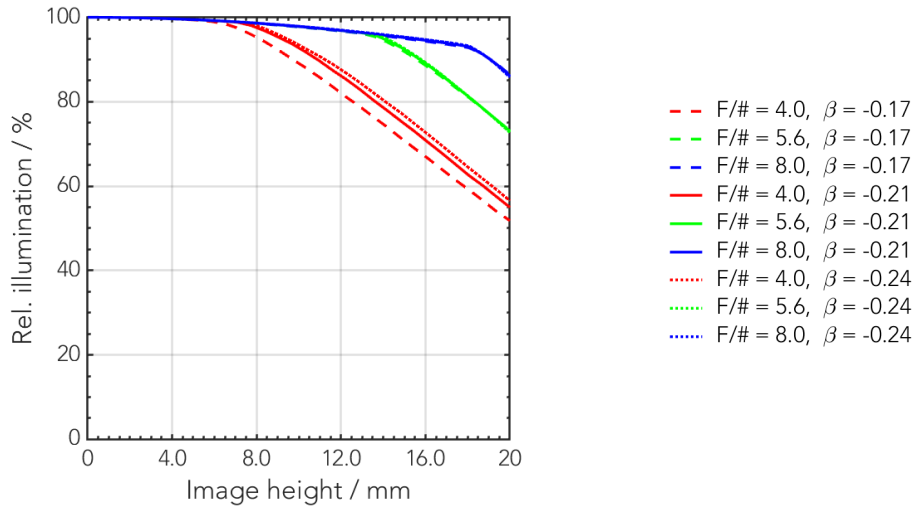
## Rel. illumination vs. image height



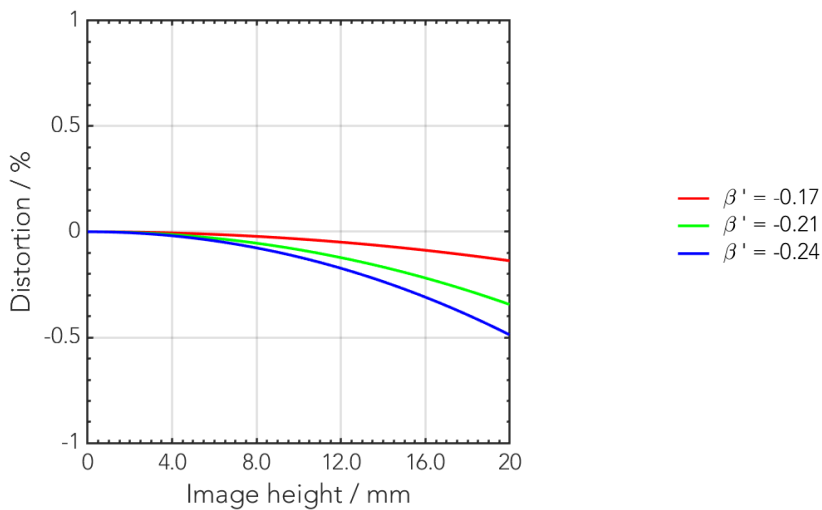
## Distortion vs. image height



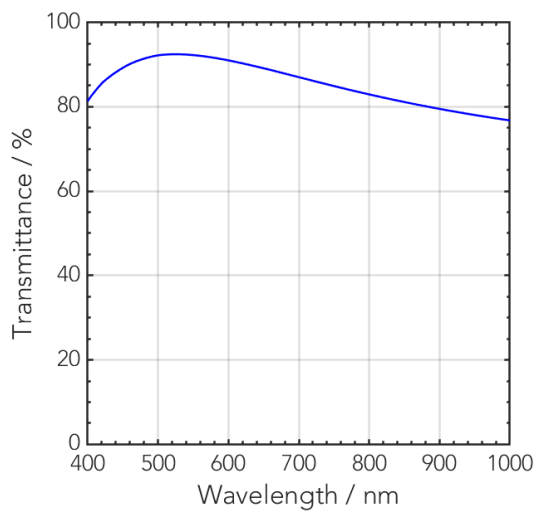
## Rel. illumination vs. image height



## Distortion vs. image height



## Transmittance vs. wavelength





| Annotation                   |   |
|------------------------------|---|
| Focal length                 | Nominal focal length  |
| F/# range                    | Image space F-number range for infinity focus position  |
| Numerical aperture           | Maximum real numerical aperture (depending on recommended magnification range either for infinity or respective fixed magnification)                              |
| Max. sensor size             | Image circle diameter   |
| Max. angle of view           | Angle of view associated with maximum sensor size (depending on recommended magnification range either for infinity or respective fixed magnification)            |
| Rec. magnification range     | Magnification range as recommended by Schneider-Kreuznach   |
| Rec. working distance range  | Working distance, i.e. distance between object and first mechanical element, associated with recommended magnification range                                      |
| Max. mechanical focus travel | Maximum possible movement of the lens from infinity position (depending on recommended magnification range either for infinity or respective fixed magnification) |
| Net weight                   | weight of unpacked lens without lens cap  |
| $f'_{\text{eff}}$            | Effective focal length  |
| SF                           | Distance between vertex of first lens surface and object space focal point  |
| S'F'                         | Distance between vertex of last lens surface and image space focal point (back focal distance at infinity)  |
| HH'                          | Distance between principal planes   |
| $\beta'P$                    | Pupil magnification (= exit pupil diameter / entrance pupil diameter)   |
| SEP                          | Distance between vertex of first lens surface and entrance pupil  |
| S'AP                         | Distance between vertex of last lens surface and exit pupil   |
| $\Sigma d$                   | Distance between vertices of first and last lens surface  |
| s'A                          | Flange focal distance (in air) for infinite object distance (depending on recommended magnification range either for infinity or respective fixed magnification)  |
| $\beta'$                     | Magnification (= image size / object size), negative value because image is inverted  |
| OO'                          | Distance between object and image   |

Unless otherwise stated all dimensions in this data sheet are in mm.