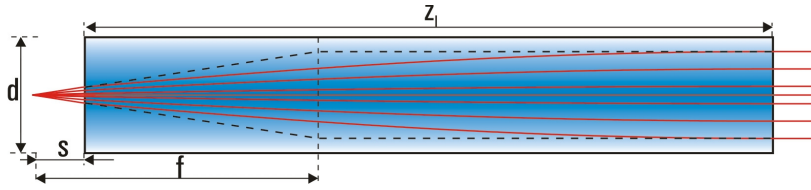


GRIN Rod Lenses – Numerical Aperture 0.2 – for high-performance collimation

with optimized gradient index profile for compensation of higher-order spherical aberrations and better beam quality



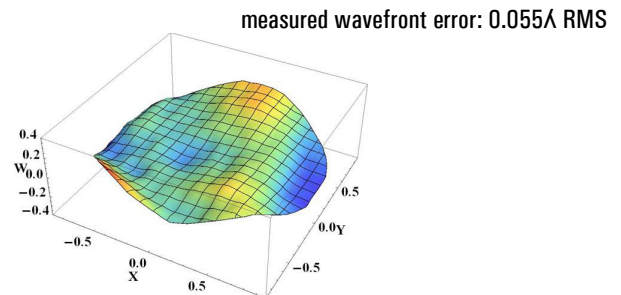
| Diameter (mm) | Pitch P | Working distance s (mm) | Numerical Aperture NA | Lens length z_l (mm) | Focal length f (mm) | Gradient constant g (mm^{-1}) | Refractive index at the center of the profile n_0 | Wavelength λ (nm) | Product code |
|---------------|---------|-------------------------|-----------------------|------------------------|---------------------|--|---|---------------------------|------------------------------|
| 1.00 | 0.25 | 0 | 0.20 | 6.04 | 2.52 | 0.260 | 1.524 | 670 | GT-CFRL-100-025-20-CC (670) |
| | 0.25 | 0 | 0.20 | 6.05 | 2.53 | 0.260 | 1.521 | 810 | GT-CFRL-100-025-20-CC (810) |
| | 0.25 | 0 | 0.19 | 6.08 | 2.55 | 0.258 | 1.515 | 1550 | GT-CFRL-100-025-20-CC (1550) |
| | 0.24 | 0.16 – 0.18* | 0.19 | 5.81 | 2.54 | 0.258 – 0.260* | 1.515 – 1.524* | 670 -1550 | GT-CFRL-100-024-20-CC (1550) |
| 1.80 | 0.25 | 0 | 0.19 | 11.06 | 4.62 | 0.142 | 1.524 | 670 | GT-CFRL-180-025-20-CC (670) |
| | 0.25 | 0 | 0.19 | 11.08 | 4.64 | 0.142 | 1.521 | 810 | GT-CFRL-180-025-20-CC (810) |
| | 0.25 | 0 | 0.19 | 11.13 | 4.68 | 0.141 | 1.515 | 1550 | GT-CFRL-180-025-20-CC (1550) |
| | 0.24 | 0.26 – 0.31* | 0.19 | 10.71 | 4.69 | 0.141 – 0.142* | 1.515 – 1.524* | 670 -1550 | GT-CFRL-180-024-20-CC (1550) |

*: depending on wavelength

- Working distance, design wavelength and lens length deviating from these standards are available on request
- ZEMAX files can be [DOWNLOADED](#) from our website

optimized

- Wavefront RMS @ 635 nm < 0.07
- diffraction limited properties
- higher order spherical aberrations are corrected
- for high-performance applications (e.g. collimators with $M^2 < 1.1$)



GRIN rod lenses are offered without antireflection coatings as standard. Antireflection coatings ($R < 1.0\%$ for the design wavelength and incidence angles of $0 \dots 30^\circ$ corresponding to measurements on a reference substrate) can be offered:

Coating Code: NC: no coating (reflection loss approx. 12 %) - standard
 C1: $\lambda = 450 \dots 690$ nm
 C2: $\lambda = 800 \dots 960$ nm
 C5: $\lambda = 1310 \dots 1550$ nm

One - sided coatings are available on request.

Order example:

| | |
|---|--|
| GT – CFRL – 100 – 025 – 20 – CC – (670) | |
| GT | GRINTECH |
| CFRL | Focusing Rod Lens for high-performance collimation |
| 100 | Diameter: 1.0, 1.8 mm |
| 025 | Pitch: 0.25 or 0.24 |
| 20 | NA: 0.20 |
| CC | Coating Code: NC, C1, C2 or C5 |
| (670) | Design Wavelength |

Variations due to modifications of the production process are possible. It is the user's responsibility to determine suitability for the user's purpose.

Tolerances / Handling Instructions

Tolerances:

For all of our single lenses we have the following fabrication tolerances and quality criteria:

Tolerances:

lens length z : $\pm 5\%$ due to variations of the gradient constant
working distance s : ± 0.02 mm
diameter d : $+ 0 / -0.01$ mm
- tighter diameter tolerances on request

Surface quality:

5 / 3 x 0.025; L 3 x 0.005; E 0
(defined by DIN ISO 10110-7:2000-02).
The surface quality is defined within 90 % of the lens diameter.
Outside of this area defects are allowed.

Storage and Handling of Lenses

Storage

GRIN lenses and lens systems should be stored in a dry environment. For short term storage, the plastic box or foam packing in which the lenses are shipped will provide adequate storage.

Recommended storage temperature: $-20^{\circ}\text{C} - 80^{\circ}\text{C}$.

Storage boxes should ensure that the lenses do not touch each other to prevent chipping and scratches. Best is to use the original box.

Handling

Lenses should be carefully handled with plastic tweezers, preferably those with a tapered end. Lenses should be picked up out of their individual compartments by firmly holding each on its side cylinder surface (not the polished ends). Especially small sized lenses may stick to the lens box material and can be lost during removal.

Cleaning

If it is necessary to clean the lens surfaces due some dust or other contaminant which may impair the optical performance GRINTECH generally recommends the use of ethyl alcohol as a cleaning solvent maybe combined with some smooth lintfree lens cleaning tissue. Acetone may also be used, but it should be pure enough otherwise it can leave some residue on the lens surface.