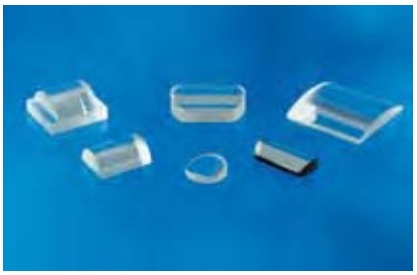
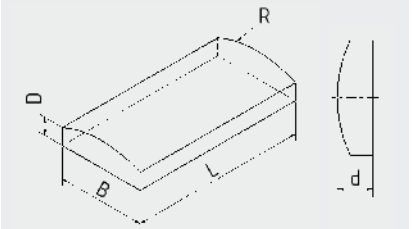
Hellma® Optik
Precision from Jena. Worldwide.

■ Cylinder Optics ■ Toric Optics ■ Special Optics

1. Cylinder Optics

1.1 . Cylinder lenses, plano-convex



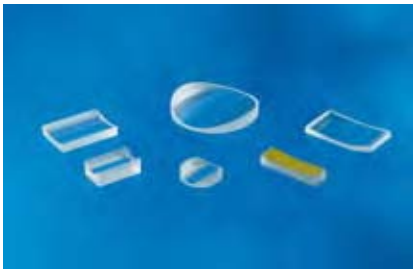


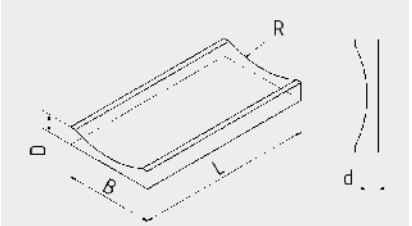
D: Edge thickness R: Radius d: Center thickness B: Width L: Length

Radius range	■ 2.5 mm radius – ∞
Length	■ For 2.5 mm – 5 mm radius: 1 mm – 40 mm ■ For 5 mm – 10 mm radius: 5 mm – 100 mm ■ For 10 mm – 1000 mm radius: 10 mm – 600 mm ■ For 30 mm – 70 mm radius: up to 3000 mm
Width	■ 1 mm – 2 R or 250 mm, respectively ■ On request, round edging can be provided for cylinder lenses: 1 mm – 2 R diameter and 350 mm (max.)
Tolerances	■ Radius variance up to 1000 mm: ± 1%, ± 5% beyond 1000 mm, up to ± 0.01 mm radius accuracy on request (depending on geometry) ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm ■ Irregularity: λ/4 per 10 mm at 633 nm, reduced to λ/10 on request, optionally available with documentary proof of certification up to maximum diameter of 150 mm (depending on radius) ■ Edge thickness variance: up to ± 0.1 mm (centration), up to 1 µ on request

Higher precision on request

1.2 Cylinder lenses, plano-concave





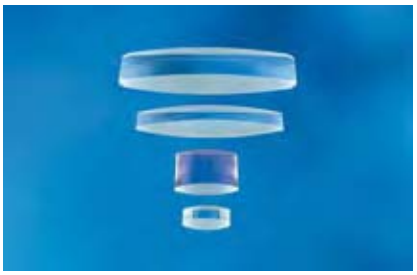
D: Edge thickness R: Radius d: Center thickness B: Width L: Length

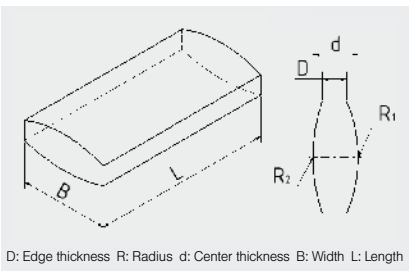
Radius range	■ 2.5 mm radius – ∞
Length	■ For 2.5 mm – 5 mm radius: 1 mm – 40 mm ■ For 5 mm – 10 mm radius: 5 mm – 100 mm ■ For 10 mm – 1000 mm radius: 10 mm – 600 mm ■ For 30 mm – 70 mm radius: up to 3000 mm
Width	■ 1 mm – 2 R or 250 mm, respectively ■ On request, round edging can be provided for cylinder lenses: 1 mm – 2 R diameter and 350 mm (max.)
Tolerances	■ Radius variance up to 1000 mm: ± 1%, ± 5% beyond 1000 mm, up to ± 0.01 mm radius accuracy on request (depending on geometry) ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm ■ Irregularity: λ/4 per 10 mm at 633 nm, reduced to λ/10 on request, optionally available with documentary proof of certification up to maximum diameter of 150 mm (depending on radius) ■ Edge thickness variance: up to ± 0.1 mm (centration), up to 1 µ on request

Higher precision on request

1. Cylinder Optics

1.3 Cylinder lenses, biconvex



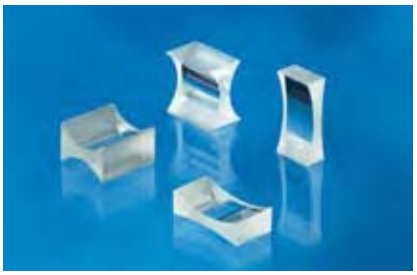


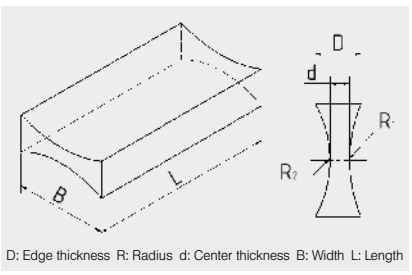
D: Edge thickness R: Radius d: Center thickness B: Width L: Length

Radius range	■ 2.5 mm radius – ∞
Length	■ For 2.5 mm – 5 mm radius: 1 mm – 40 mm ■ For 5 mm – 10 mm radius: 5 mm – 100 mm ■ For 10 mm – 1000 mm radius: 10 mm – 600 mm ■ For 30 mm – 70 mm radius: up to 3000 mm
Width	■ 1 mm – 2 R or 250 mm, respectively ■ On request, round edging can be provided for cylinder lenses: 1 mm – 2 R diameter and 350 mm (max.)
Tolerances	■ Radius variance up to 1000 mm: ± 1%, ± 5% beyond 1000 mm, up to ± 0.01 mm radius accuracy on request (depending on geometry) ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm ■ Irregularity: λ/4 per 10 mm at 633 nm, reduced to λ/10 on request, optionally available with documentary proof of certification up to maximum diameter of 150 mm (depending on radius) ■ Edge thickness variance: up to ± 0.1 mm (centration), up to 1 µ on request

Higher precision on request

1.4 Cylinder lenses, biconcave





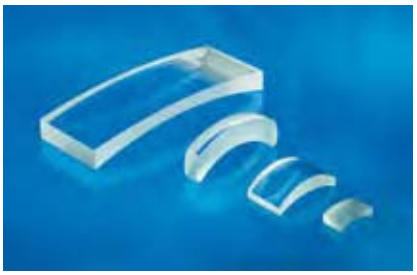
D: Edge thickness R: Radius d: Center thickness B: Width L: Length

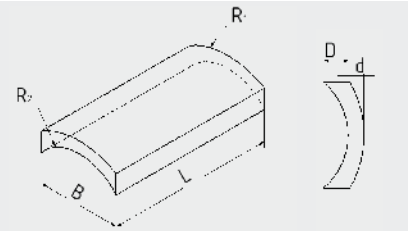
Radius range	■ 2.5 mm radius – ∞
Length	■ For 2.5 mm – 5 mm radius: 1 mm – 40 mm ■ For 5 mm – 10 mm radius: 5 mm – 100 mm ■ For 10 mm – 1000 mm radius: 10 mm – 600 mm
Width	■ 1 mm – 2 R or 250 mm, respectively ■ On request, round edging can be provided for cylinder lenses: 1 mm – 2 R diameter and 350 mm (max.)
Tolerances	■ Radius variance up to 1000 mm: ± 1 %, ± 5 % beyond 1000 mm, up to ± 0.01 mm radius accuracy on request (depending on geometry) ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm ■ Irregularity: λ/4 per 10 mm at 633 nm, reduced to λ/10 on request, optionally available with documentary proof of certification up to maximum diameter of 150 mm (depending on radius) ■ Edge thickness variance: up to ± 0.1 mm (centration), up to 1 µ on request

Higher precision on request

1. Cylinder Optics

1.5 Cylinder lenses, convexo-concave



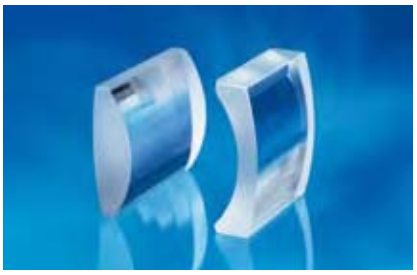


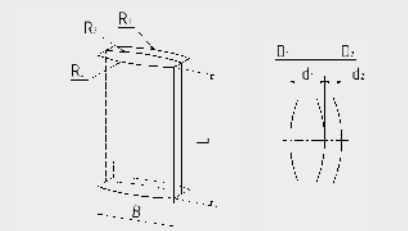
D: Edge thickness R: Radius d: Center thickness B: Width L: Length

Radius range	■ 2.5 mm radius – ∞
Length	■ For 2.5 mm – 5 mm radius: 1 mm – 40 mm ■ For 5 mm – 10 mm radius: 5 mm – 100 mm ■ For 10 mm – 1000 mm radius: 10 mm – 600 mm
Width	■ 1 mm – 2 R or 250 mm, respectively ■ On request, round edging can be provided for cylinder lenses: 1 mm – 2 R diameter and 350 mm (max.)
Tolerances	■ Radius variance up to 1000 mm: ± 1%, ± 5% beyond 1000 mm, up to ± 0.01 mm radius accuracy on request (depending on geometry) ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm ■ Irregularity: λ/4 per 10 mm at 633 nm, reduced to λ/10 on request, optionally available with documentary proof of certification up to maximum diameter of 150 mm (depending on radius) ■ Edge thickness variance: up to ± 0.1 mm (centration), up to 1 µ on request

Higher precision on request

1.6. Cylindrical achromats





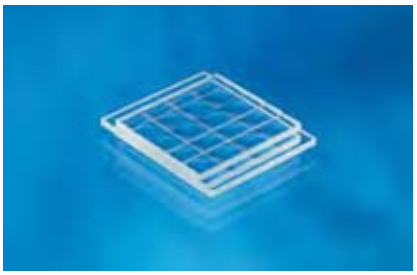
D: Edge thickness R: Radius d: Center thickness B: Width L: Length

Radius range	■ 2.5 mm radius – ∞
Length	■ For 2.5 mm – 5 mm radius: 1 mm – 40 mm ■ For 5 mm – 10 mm radius: 5 mm – 100 mm ■ For 10 mm – 1000 mm radius: 10 mm – 600 mm
Width	■ 1 mm – 2 R or 250 mm, respectively ■ On request, round edging can be provided for cylinder lenses: 1 mm – 2 R diameter and 350 mm (max.)
Tolerances	■ Radius variance up to 1000 mm: ± 1 %, ± 5 % beyond 1000 mm, up to ± 0.01 mm radius accuracy on request (depending on geometry) ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm ■ Irregularity: λ/4 per 10 mm at 633 nm, reduced to λ/10 on request, optionally available with documentary proof of certification up to maximum diameter of 150 mm (depending on radius) ■ Edge thickness variance: up to ± 0.1 mm (centration), up to 1 µ on request

Higher precision on request

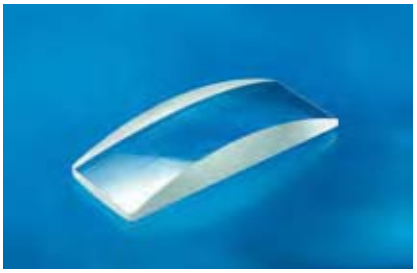
1. Cylinder Optics

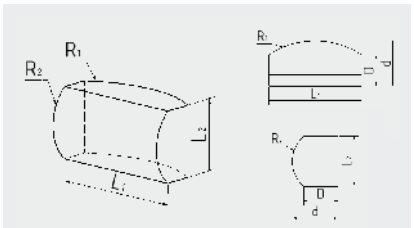
1.7 Cylinder lens arrays



Available on request (to customer-specified dimensions)

1.8 Crossed cylinders, biconvex, biconcave, convexo-concave





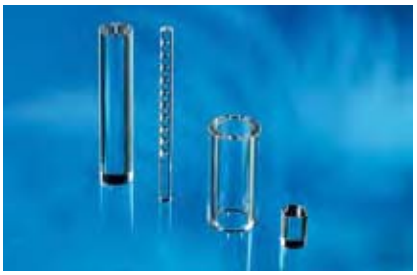
D: Edge thickness R: Radius d: Center thickness B: Width L: Length

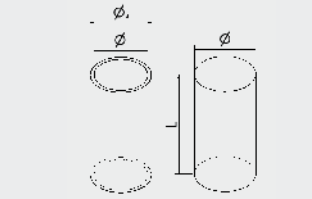
Radius range	■ 5 mm radius – ∞
Length	■ 5 mm – 200 mm
Width	■ 5 mm – 200 mm
Tolerances	■ Radius variance up to 1000 mm: ± 1%, ± 5% beyond 1000 mm, up to ± 0.01 mm radius accuracy on request (depending on geometry) ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm ■ Irregularity: λ/4 per 10 mm at 633 nm, reduced to λ/10 on request, optionally available with documentary proof of certification up to maximum diameter of 150 mm (depending on radius) ■ Edge thickness variance: up to ± 0.1 mm (centration), up to 1 µ on request

Higher precision on request

1. Cylinder Optics

1.9 Cylinder bars & cylinder tubes



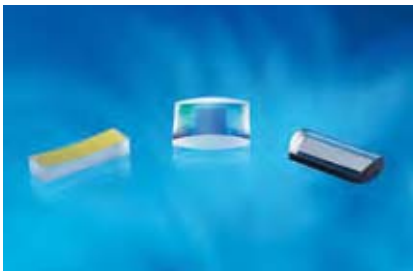


Ø: Diameter
$Ø_i$: Inner diameter
$Ø_a$: Outer diameter
L: Edge length

Radius range	■ 5 mm – 100 mm radius
Length	■ 5 mm – 200 mm (depending on geometry)
Tolerances	■ Radius variance: ± 1% ■ Length: ± 0.1 mm

Higher precision on request

1.10 Cylinder mirrors



	To provide mirror reflection, we offer silver, gold and aluminum coatings. For greater resistance, each coating has its own protective layer of quartz.
Dimensions	Available in any combination of cylinder optics range of offering
Tolerances	Same as other cylinder optics

2. Toric Optics

Quality that our customers can rely on at all times – this is our strength.

Rather than just maintaining it, we seek to continually optimize our high level of proficiency. We offer toric optics of the highest quality, predestined to perform exacting tasks in laser engineering and any other area of application. We fully adapt to the requirements and needs of our customers. This implies refinement and continuous extension of the radius and length ranges in which our products are available. Within specified limits we are able to provide toric optical components in any desired version as regards radius, length and width.

Hellma quality means 100% final inspection. We take pride in proving this statement. Tactile test reports can easily be provided on customer request and computer generated holograms will be included with large product batches.

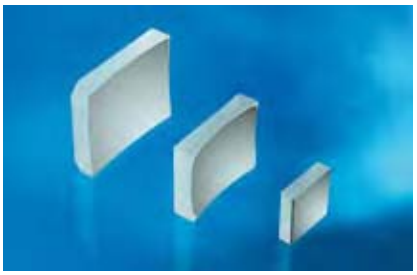
The capabilities of applied coatings and selected materials correspond to those of our cylinder optical products.

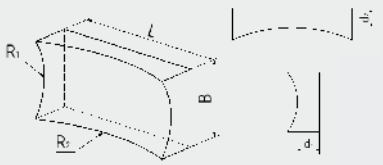
Product range:

- Toric mirrors, biconvex/biconcave
- Toric optics, biconvex/biconcave
- Toric optics, convexo-concave

2. Toric Optics

2.1 Toric mirrors, biconvex/biconcave



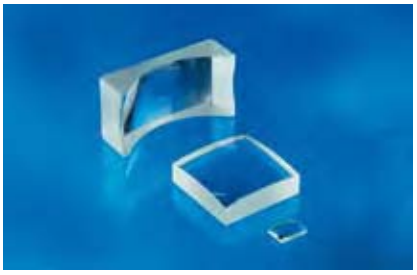


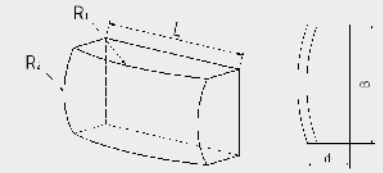
See 2.2 for biconvex
R: Radii d: Center thickness B: Width L: Length

Radius range	■ 2.5 mm – 10.000 mm radius
Length	■ 5 mm – 200 mm
Width	■ 5 mm – 200 mm
Tolerances	■ Radius variance ± 1 % ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm

Higher precision on request

2.2 Toric optics, biconvex/biconcave



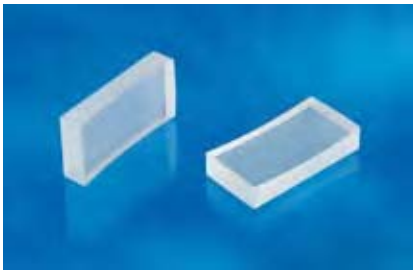


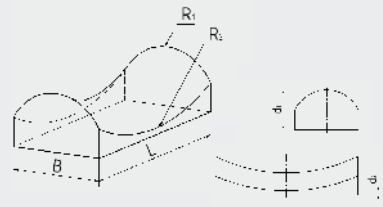
See 2.1 for biconcave
R: Radii d: Center thickness B: Width L: Length

Radius range	■ 2.5 mm – 10.000 mm radius
Length	■ 5 mm – 200 mm
Width	■ 5 mm – 200 mm
Tolerances	■ Radius variance ± 1% ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm

Higher precision on request

2.3 Toric optics, convexo-concave





R: Radii d: Center thickness B: Width L: Length

Radius range	■ 2.5 mm – 10.000 mm radius
Length	■ 5 mm – 200 mm
Width	■ 5 mm – 200 mm
Tolerances	■ Radius variance ± 1 % ■ Length: ± 0.1 mm ■ Width: ± 0.1 mm

Higher precision on request

4. Special Optics

Non-standard features in material and workmanship are what distinguishes our special optics. In addition to the products described previously, we manufacture special optical components with plane and cylindrical active surfaces.

Strongly refracting glass types can be processed as can special materials, for example, metals like steel and titanium, crystals like calcium fluoride or sapphire and other materials such as germanium or silicon.

Supported by the use of advanced machinery and integrated technologies that include diffusion bonding and ultra-sonic drilling, we are able to obtain complex shapes. Components can be assembled to modules by diffusion bonding and optical contacting.

Special optics are produced to proven quality per customer requests and requirements. It goes without saying that the quality of polished surfaces will meet the most stringent requirements of laser technology.

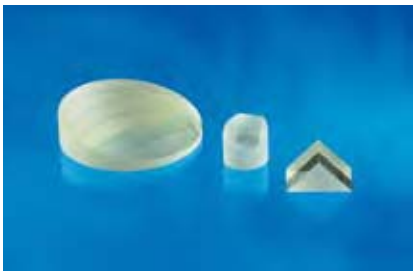
To process very sensitive materials such as glass, technical ceramics or crystals, it takes special techniques. Minute holes, including microstructures, can be produced with the help of ultra-sonic drilling, a method that is both material-preserving and flexible in terms of shape.

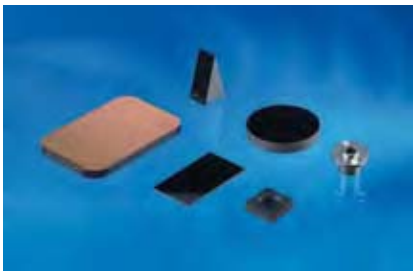
Diffusion bonding of the type which is employed on our products represents a proprietary Hellma technique developed for material joining. It facilitates shapes that cannot be attained with other methods. The exceptionally high quality of diffusion bonded joints can even equal that of the selected material itself. When handled properly diffusion bonding will induce no changes in the optical properties of the material.

Product range:

- Optics of high-refractive materials
- Optics of special materials
- Ultra-sonic-drilled optics
- Axicons, cones
- Diffusion bonded optics
- Special optics

4. Special Optics

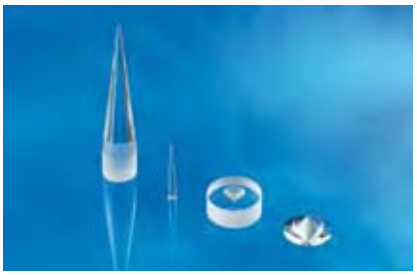
4.1 Optics of high-refractive material	
Material	Special optics require materials with a refractive index > 1.7 These include (but are not limited to): ■ SF 57 ■ SF 6 ■ N-LASF9
Dimensional & shape details	To individual customer request

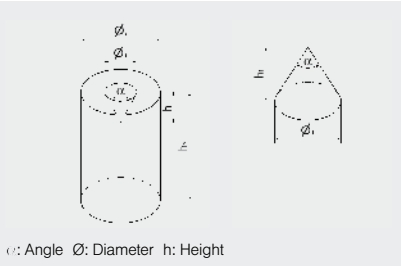
4.2 Optics from special materials	
Material	Examples of so-called special materials are: ■ Calcium fluoride ■ Silicon ■ Sapphire ■ Steel ■ Germanium
Dimensional & shape details	To individual customer request

4.3 Ultrasonically drilled optics	
Drill-hole	■ 0.5 mm and greater, smaller holes on request ■ Precisely positioned
Tolerance	■ ± 0.1 mm (referred to drill-hole)
Dimensional & shape details	To individual customer request

4. Special Optics

4.4 Axicons & cones

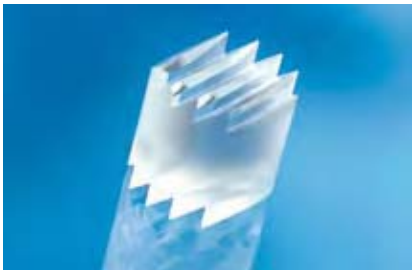




α: Angle Ø: Diameter h: Height

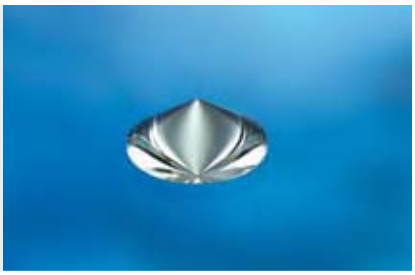
Dimensional details	■ Diameter: 5 mm – 50 mm ■ Angle: 1° – 45°
Tolerance	■ Angular accuracy: ± 5´

4.5 Diffusion bonded optics



Available on request (to customer-specified dimensions)

4.6 Other special optics



Your customized request for special optics is welcomed. Manufacturing can fully adapt to your requested specifications. Basically, any shape can be delivered. Contact us for available capabilities in terms of dimensional, shape and material design.

Higher precision on request