

# CYLINDRICAL OPTICS.

PRECISE BEAM SHAPING & EXPANSION.



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Berliner Glas produces cylindrical optics in high precision for a wide range of applications for beam guidance and homogenization of laser radiation, for example for laser annealing and lift-off processes in material processing. Other applications range from data communication in space to anamorphic image correction in movie images and reproductions.

## PRODUCTS

- ▶ Cylindrical lenses and mirrors – concave and convex
- ▶ Cylindrical cemented groups (double and triple) in the highest centering
- ▶ Array lenses for beam homogenization
- ▶ Combined lenses (spherical radii and cylindrical radii)

## SPECIFICATIONS\*

Material	quartz glass, optical glass and glass ceramics
Length	≤ 2,000 mm, larger on request
Radii	2 mm–∞
Fitting error	< $\lambda/10$ PV (@ 633 nm)
Centering	rotation: ≤ 10" offset: ≤ 4 μm wedge: ≤ 3 μm
Surface error	from 5/1 x 0.016
Roughness	≤ 0.2 nm rms

## FINE CORRECTING PROCEDURES

- ▶ Ion beam figuring
- ▶ Portal-/robot polishing
- ▶ Magnetorheological finishing (MRF)

## NOTES

All products can be coated. A customer-specific mounting to array fields or tip-tilt units is possible. Furthermore, the design of the outer lens contours can be carried out according to customer specifications.

## METROLOGY

Wavefront	interferometer (4–24"), Shack-Hartmann wavefront sensor (UV, DUV, VIS, NIR), radii metrology, multiple area metrology, stitching interferometer
Form deviation	3D coordinate measuring device, aliper, CCD micrometer, interferometer
Surface defects	various microscopic methods
Roughness	white light interferometer, atomic force microscope
Centering	lens test control unit, laser centering station
Additional functional measurements	enviromental/climatic tests acc. to ISO and MIL standards abrasion and adhesion tests, various chemical and resistance testings, autoclaving, surface measurements, resistance measurements

\* The following error and tolerance data indicates possible limit values. Specified and assessed according to ISO/MIL/DIN. Limit values cannot be combined freely.