

## ZNSE LENSES



### DESCRIPTION

Zinc selenide (ZnSe) components are primarily used for transmissive optics. They are made exclusively with high quality "laser grade" material that can be used even in the kW range.

The standard lenses are AR coated at 10.6  $\mu\text{m}$ , but coatings at 9.35  $\mu\text{m}$  or special wide band AR or dual band AR coatings are also available upon request.

### FEATURES

- / Meniscus lenses
- / Plano-convex/plano-concave lenses
- / Biconvex/biconcave lenses
- / Cylindrical lenses (circular, rectangular)

### APPLICATIONS

- / Many CO<sub>2</sub> lasers are used in welding, cutting, marking, etching and other industrial applications.
- / Positive lenses are used to focus the laser beam or as one element in a beam expanding telescope.
- / Negative lenses are generally used as one element in a beam expanding telescope.
- / Cylindrical lenses are often used as one element in a 'line-focus' system for CO<sub>2</sub> lasers.

## SPECIFICATIONS

Diameter tolerance [mm]	+0/-0.2
Thickness tolerance [mm]	±0.25 mm
Centration [mm]	ETV ≤ 0.05 (ETV = Edge Thickness Variation)
Surface figure [μm]	typ. λ/20 at 10.6 (depends on diameter thickness ratio)
Surface quality	40 - 20
Focal tolerance	< ± 0.5% @10.6 μm
Clear aperture [%]	> 85 of diameter
Total component absorption	Standard: < 0.25% up to 9 mm thickness low absorption option: < 0.15% up to 9 mm thickness (typ. < 0.12%)
Total transmission	T > 99.4%, coated AR/AR at 10.6 μm, depends on thickness
Reflection per side	R < 0.25%, coated AR at 10.6 μm
Laser damage threshold of coated component	depends on the beam diameter, typ. 3000 W/mm (CW CO <sub>2</sub> Laser) (3 kW per mm of beam dia. 1/e <sup>2</sup> )

## Simulations

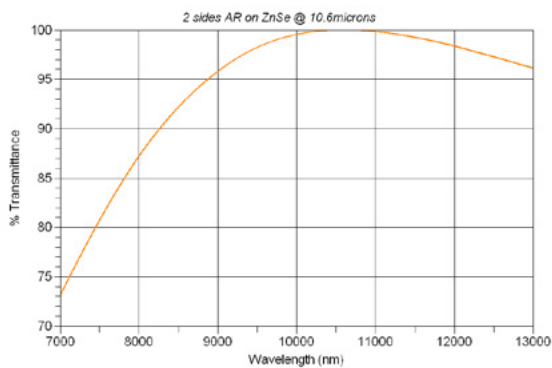


Fig. 1:

Transmission over wavelength for both side AR/AR10.6 coated ZnSe lens

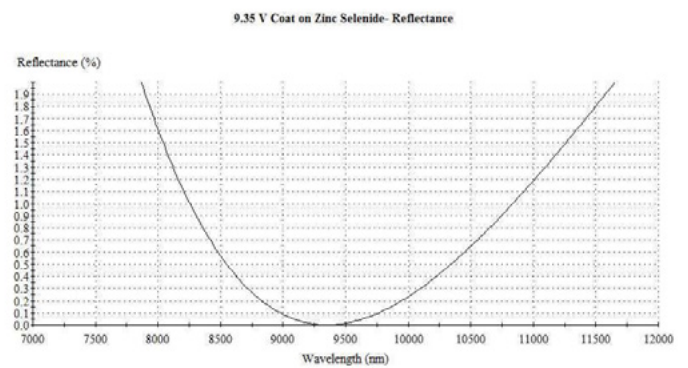


Fig. 2:

Reflectance over wavelength for AR9.35 coating on ZnSe

## GOOD TO KNOW

**1. Lens types**

**Meniscus lenses** have a convex/concave surface by which the relevant aberration – the spherical aberration – is reduced. Therefore, meniscus lenses offer a smaller focus size. The effect depends on the focal length and the difference is less important for longer focal lengths.

Manufacturing of **plano-convex lenses** is more economic. For applications with high F-numbers (long focal length) or when spot size is not so critical they are preferred.

**Negative plano-concave lenses, biconvex and biconcave lenses** can be offered on request.

**Cylindrical lenses** have a planar and a curved surface in which the radius continues along one axis, which results in a focal line instead of a focal point. We offer them in either circular or rectangular shapes.

**2. Dimensions**

ZnSe lenses can be fabricated in diameters from 4.0 mm up to 250 mm (spherical lenses) /up to 100 mm (cylindrical lenses), typical sizes are Ø1.0 inch up to Ø2.0 inch. The typical thickness range is from 2 mm to 9 mm (available from 1 – 25 mm). We offer ZnSe lenses with focal length starting at typically 25 mm. Customer designs are possible.

**3. Thickness/Pressure**

Because some lenses serve as the endpoint of the excess pressure region in a cutting head, the required edge thickness and the resulting maximum pressure load must be increased as necessary. For this reason, we differentiate between normal pressure and high-pressure lenses. We offer a standard range of normal pressure and high-pressure lenses (> 25 bar). The edge thickness of the lens must be adapted accordingly.

**4. Coating**

Standard coating is for 10.6 µm or 9.35 µm, other coatings are also available, like for example

- / Broad band BBAR/BBAR 8 – 12 µm or 3 – 5 µm or
- / Wide band WBAR/WBAR 3 – 12 µm or 1 – 5 µm or
- / Dual AR/AR 10.6 µm + 633 nm

Standard AR/AR coatings have very-low absorption, which helps to minimize thermal lensing effects when used with high intensity laser beams.

**5. For inquiries, we need to know:**

- / Diameter
- / Thickness (or max. pressure)
- / Focus length
- / Wavelength (range) or which coating is requested

**Customer designs are available upon request.**

**6. Handling**

Safety data sheet and handling inspections are available upon request (in German only).

## PRODUCT CODES

**Meniskus Lenses**

	Diameter	Focal Length	Edge Thickness
<b>LMZ/LMNZ</b>	<b>(inch x 10)</b>	<b>(inch x 10)</b>	<b>(mm)</b>

Example:

LMZ-1025-2.5 (positive meniscus lens, diameter 1 inch, focal length 2.5 inch, edge thickness 2.5 mm)

LMNZ-1025-2.5 (negative meniscus lens, diameter 1 inch, focal length 2.5 inch, edge thickness 2.5 mm)

**Plano Convex/Plano Concave Lenses**

	Diameter	Focal Length	Edge Thickness
<b>LXZ/LCZ</b>	<b>(inch x 10)</b>	<b>(inch x 10)</b>	<b>(mm)</b>

Example:

LXZ-1025-2.5 (Plano-convex lens, diameter 1 inch, focal length 2.5 inch, edge thickness 2.5 mm)

LCZ-1025-2.5 (Plano-concave lens, diameter 1 inch, focal length 2.5 inch, edge thickness 2.5 mm)

**Round Cylindrical Lenses**

	Diameter	Focal Length	Edge Thickness
<b>CLCX/CLCZ</b>	<b>(inch x 10)</b>	<b>(inch x 10)</b>	<b>(mm)</b>

Example:

CLXZ-1025-3.9, (Plano-convex cylindrical lens, diameter 1 inch, focal length 2.5 inch, edge thickness 3.9 mm)

CLCZ-1025-3.9, (Plano-concave cylindrical lens, diameter 1 inch, focal length 2.5 inch, edge thickness 3.9 mm)

**Rectangular Cylindrical Lenses**

	Width	Length	Focal Length
<b>RXZ/RCZ</b>	<b>(mm)</b>	<b>(mm)</b>	<b>(mm)</b>

Example:

RXZ-25.4-25.4-190 (Rectangular convex cylindrical lens, dim. 25.4 x 25.4 mm, focal length 190 mm)

RCZ-30-30-50 (Rectangular concave cylindrical lens, dim. 30.0 x 30.0 mm, focal length 50 mm)