

Plane Substrates

Substrates with plane surfaces are used, for example, as bending mirrors, dichroic mirrors, or windows. The finest polished optics with a planarity of $\lambda/10$ are normally used in laser applications.

The polish specification of substrates depends on the application. When used as mirrors, the glasses are finely polished on at least one side. When used in transmission, both sides of the substrate are polished to laser grade quality.

The plane substrates differ in the specification of the wedge angle and are available in different forms and sizes.

Note

The right selection of material is important in laser optics. Furthermore, the materials can be provided with different levels of quality.

Before coating, the typical surface quality of 1.0" substrates made of BK7 or fused silica is as follows:

- Surface figure:
3/0.2 (0.2/-) according to ISO 10110
 $\lambda/10$ according to MIL-O-1380A
- Surface quality:
5/4x0.025 according to ISO 10110
10-5 according to MIL-O-1380A



Wedge Substrates

If the laser beam has to be deflected by a very small angle in transmission, so-called wedge windows are used. Furthermore, they are used as mirrors or output couplers when back reflections occur that render the laser unstable, even though an AR coating has been applied. In order to ensure the high quality of the components, only finely polished substrates with an extremely high surface figure are used.

Note

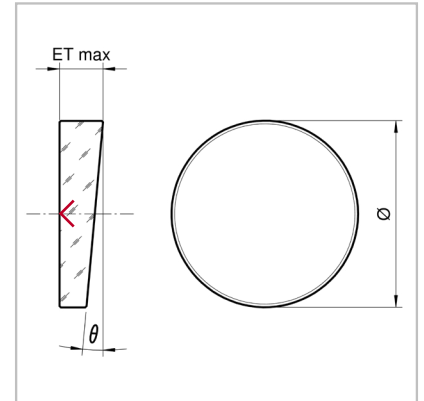
Depending upon the application, wedge windows with an angle of 0.5° are often used to suppress a back reflection into the resonator. These features can be found in the PI series.

Wedge angles of 1° , 2° , and even 3° have proven themselves useful when used as windows for beam deflection. Wedge substrates with large angles can be found in the the PL series.



Interferometer Wedge Substrates – PI Series

The PI series (Plane Interferometer Substrates) is often used by fs laser users to avoid back reflections into the cavity.



Specifications

Material	BK7, fused silica
Diameter tolerance	+ 0.00 mm; - 0.20 mm
Thickness tolerance	± 0.20 mm
Wedge angle	$\theta = 0.5^\circ \pm 5$ arc minutes
Surface quality	5/4 x 0.025 for 1.0" substrates according to ISO 10110 10-5 according to MIL-O-1380A
Protective chamfer	0.2 – 0.4 mm x 45° typ.
Clear aperture	85 % of diameter

Nomenclature

PI	10	08	UV
Product Code (Plane Interferometer Substrates)	Diameter in inches x 10	Thickness in inches x 100	Material Code UV: Fused Silica C: BK7

Fused Silica / BK7 Interferometer Flats

Part No. Fused Silica	Part No. BK7	Diameter Ø	Thickness ET _{max}	Surface Figure Fused Silica	Surface Figure BK7
PI0525UV	PI0525C	0.500"	0.250"	λ/10	λ/10
PI0725UV	PI0725C	0.750"	0.250"	λ/10	λ/10
PI1008UV	PI1008C	1.000"	2.00 mm	λ/4	λ/4
PI1012UV	PI1012C	1.000"	0.125"	λ/10	λ/4
PI1025UV	PI1025C	1.000"	0.250"	λ/10	λ/10
PI1037UV	PI1037C	1.000"	0.375"	λ/10	λ/10

Most items are available from stock. Other sizes and materials are available upon request.

Wedge Substrates with Large Angles – PL Series

The PL series (Plane Large Wedge) features the same characteristics as the PL series with a large wedge angle of 1°, 2°, or even 3°. The windows are used when the laser beam is supposed to be strongly deflected in transmission.

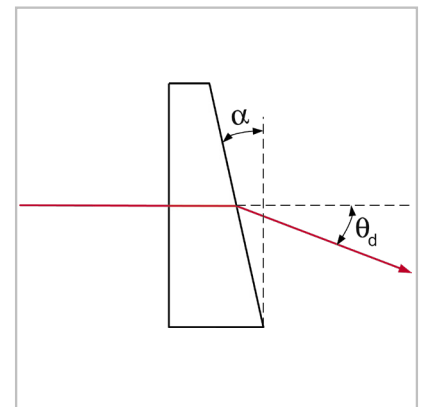
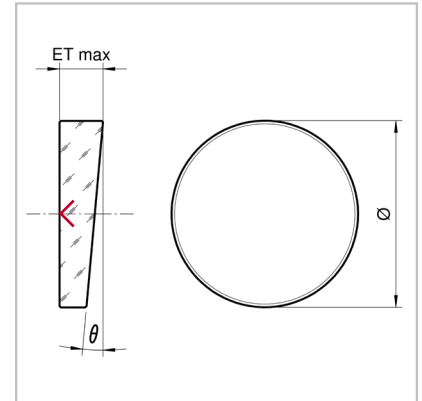
Substrate Material

Substrate materials should be selected based on the application. BK7 and fused silica are common materials; for fs laser applications fused silica is recommend. Additional materials are available. Address all of your needs directly to our product specialists.

Deflection of the Beam in Transmission

The deflection θ of the beam can be calculated for wedge angles of up to $\approx 5^\circ$ as follows:

$$\theta_d \approx (n - 1) \times \alpha$$



Specifications

Material	BK7, fused silica
Diameter tolerance	+ 0.00 mm; - 0.20 mm
Thickness tolerance	± 0.20 mm
Wedge angle	$\theta = 1.0^\circ \pm 5$ arc minutes $\theta = 2.0^\circ \pm 5$ arc minutes $\theta = 3.0^\circ \pm 5$ arc minutes
Surface figure	3/0.2 according to ISO 10110 $\lambda/10$ according to MIL-O-1380A
Surface quality	5/4 x 0.025 for 1.0" substrates according to ISO 10110 10-5 according to MIL-O-1380A
Protective chamfer	0.2 – 0.4 mm x 45°
Clear aperture	85 % of diameter

Nomenclature

PL	1	-10	08	UV
Product Code (Plane Large Wedge)	Wedge angle in degrees	Diameter in inches x 10	Thickness in inches x 100	Material Code UV: Fused Silica C: BK7

Fused Silica / BK7 Large Wedge Blanks

Part No. Fused Silica	Part No. BK7	Wedge Angle	Diameter Ø	Thickness ET _{max}
PL1-1025UV	PL1-1025C	1°	1.000"	0.250"
PL1-1537UV	PL1-1537C	1°	1.500"	0.375"
PL2-1025UV	PL2-1025C	2°	1.000"	0.250"
PL2-1537UV	PL2-1537C	2°	1.500"	0.375"
PL2-2037UV	PL2-2037C	2°	2.000"	0.375"
PL3-1025UV	PL3-1025C	3°	1.000"	0.250"
PL3-2037UV	PL3-2037C	3°	2.000"	0.375"

Other sizes and materials are available upon request.

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