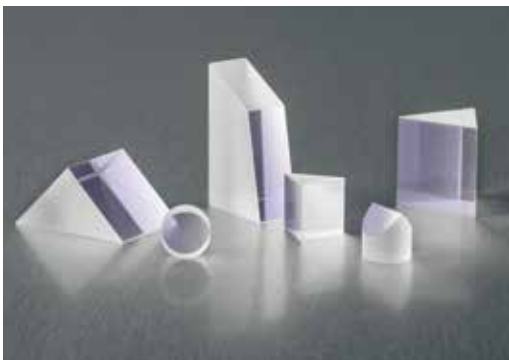


PRISMS



CVI Laser Optics manufactures a large selection of high quality prisms for use in many applications including diverse industrial and scientific uses, laser tracking and alignment, spectroscopy, and military applications such as range finding and atmospheric monitoring. The CVI prism offering includes wedge prisms, right-angle prisms, and Pellin Broca prisms. Standard products are available in Standard Grade Corning 7980 1-D (Fused Silica) and N-BK7, and depending on the application, can be coated with one of our many available anti-reflection coatings. Custom dimensions and coatings are also available. We encourage you to contact CVI Laser Optics directly for more information.

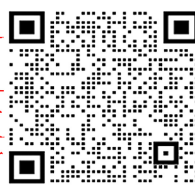
SELECTION GUIDE	144
WEDGE WINDOWS (RISLEY PRISMS)	145
RIGHT-ANGLE PRISMS	146
PELLIN BROCA PRISMS	148

Don't see exactly what you are looking for?

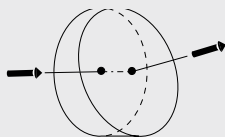
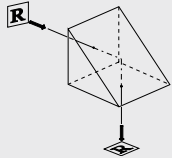
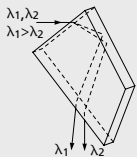
CVI Laser Optics specializes in
prototype to volume production manufacturing!

Give us a call and we will be honored to assist you with your custom needs.

NOTES:



SELECTION GUIDE

PRODUCT TYPE	DESCRIPTION	PAGE
WEDGE WINDOWS/PRISMS: LW-C, LW-UV 	Wedge windows or prisms deviate an incident beam at a precise angle. Two wedge prisms of equal power can be combined to create a beam-steering apparatus that can place a beam anywhere within a cone defined by the deviation angle.	145
RIGHT-ANGLE PRISMS: RAP-C, RAP-UV, P90-C, P90-UV, P180-C, P180-UV 	Right-angle prisms bend the image by 90° and invert the image. Right-angle prisms may also be used to retroreflect a collimated beam (bend the image 180°).	146
PELLIN BROCA PRISMS: PLBC 	In a Pellin Broca prism, light enters the right-angle prism normal to one of its faces, is turned exactly 90°, is presented to the second "half" dispersing prism in minimum deviation, and hence exits the Pellin Broca prism deviated at exactly 90° to its initial direction. This is what is meant by calling the Pellin Broca prism a "constant deviation prism".	148



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Mirrors

Spherical
Lenses

Cylindrical
Lenses

Multielement
Lenses

Waveplates

Windows and
Optical Flats

Beamsplitters

Polarization
Components

Ultrafast
Components

Prisms

Filters

LARGE WEDGE WINDOWS: LW



Large wedge windows are laser quality windows manufactured with wedges of 1° or 3°. These larger wedges prevent interference by stray back reflection and have several applications in beam steering.

- ▶ All CVI Laser Optics low loss, high energy AR coatings available
- ▶ Other dimension, wedge or material options available for OEM applications

Specifications

Product Code: **LW**

Optical Material:

Standard Grade Corning 7980 1-D (Fused Silica)
or N-BK7

Diameter Tolerance: +0/-0.25mm

Thickness Tolerance: ±0.25mm

Wedge Tolerance: ±6 minutes

Chamfer: Ø ≤ 50.8mm: leg width 0.35mm at 45° nominal
Ø > 50.8mm: 0.85mm leg width at 45° nominal

Surface Quality: 10-5 scratch-dig per MIL-PRF-13830b

Transmitted Wavefront Error (TWE): < λ/10 p-v at 633nm

Clear Aperture: ≥85% of central diameter

LARGE WEDGE WINDOWS			
Standard Grade Corning 7980 1-D (Fused Silica)			
Ø	* t (mm)	Wedge α	PART NUMBER
25.4	9.53	1°	LW-1-1037-UV
50.8	9.53	1°	LW-1-2037-UV
25.4	9.53	3°	LW-3-1037-UV
50.8	9.53	3°	LW-3-2037-UV
76.2	12.7	3°	LW-3-3050-UV
N-BK7			
Ø	* t (mm)	Wedge α	PART NUMBER
25.4	9.53	1°	LW-1-1037-C
50.8	9.53	1°	LW-1-2037-C
25.4	9.53	3°	LW-3-1037-C
50.8	9.53	3°	LW-3-2037-C

*Thick end of wedge

To apply an AR coating on any of the RW products refer to page 93 and replace Steps 2,3,4 with any of the product codes listed above.

Using Large Wedge Windows

For small angles of incidence, the deviation of a ray incident on a wedged window with wedge angle α is

$$\theta_d = \frac{\eta_s}{\eta_a} \alpha$$

The first reflected ray is misaligned from the initial axis by an angle defined by

$$\theta_r = \frac{2\eta_s \alpha}{\eta_a}$$

If $\eta_a = 1$, then $\theta_r = 2\eta_s \alpha$.

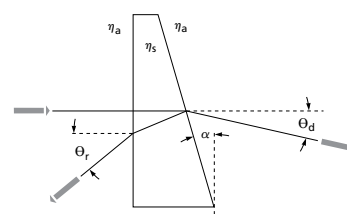


Figure 1. Deviation and reflection of beam by a wedged window of wedge α

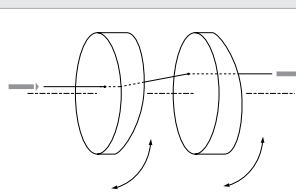


Figure 2. A beamsteering wedge formed from two wedged prisms



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RIGHT-ANGLE PRISMS: RAP-C, RAP-UV



Right angle prisms (RAP) are most commonly used for image rotation, redirection of light, and as components for both polarizing and non-polarizing beamsplitter cubes. Because of their simple 45°-45°-90° design and high-quality surface polish, they can be used as high energy 90° bending prisms or 180° folding prisms. They can be anti-reflection coated in these applications to increase overall transmission, or metal coated for use as external turning mirrors.

- Contact CVI Laser Optics for other dimensions or material options for OEM applications

Specifications

Product Code: **RAP-C, RAP-UV**

Optical Material: N-BK7 or Standard Grade Corning 7980 1-D (Fused Silica)

Dimensional Tolerance: +0/-0.25mm

Angular Deviation: ± 3 arc minutes

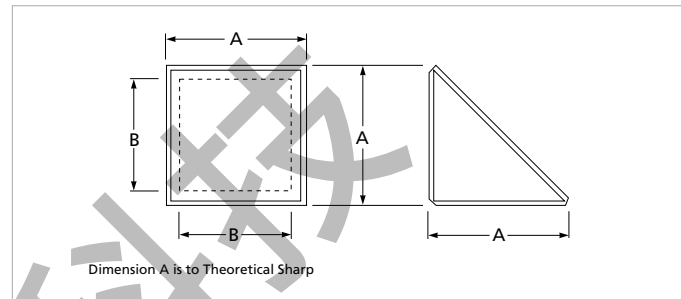
Chamfer: 0.35mm leg width at 45° nominal

Surface Quality: Per MIL-PRF-13830b; see table

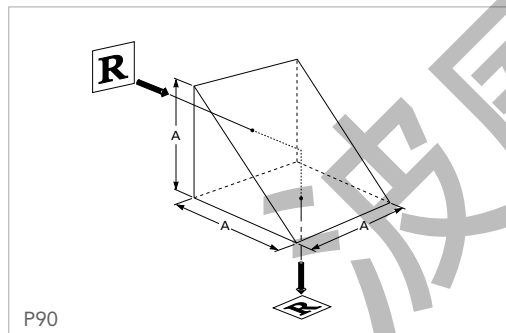
Surface Figure:

N-BK7: $< \lambda/4$ p-v at 633nm before coating

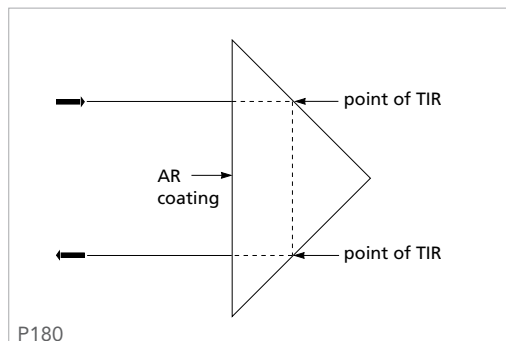
Fused Silica: $< \lambda/10$ p-v at 633nm before coating



Uncoated right-angle prisms



P90



P180

RIGHT-ANGLE PRISMS

N-BK7

*Surface Figure	Surface Quality	A (mm)	Clear Aperture B (mm) min.	PART NUMBER
$< \lambda/4$	20-10	5.0	3.0	RAP-020-C
$< \lambda/4$	20-10	10.0	8.0	RAP-040-C
$< \lambda/4$	20-10	12.7	10.8	RAP-050-C
$< \lambda/4$	20-10	15.0	12.8	RAP-060-C
$< \lambda/4$	20-10	20.0	17.0	RAP-080-C
$< \lambda/4$	20-10	25.4	21.6	RAP-100-C
$< \lambda/2$	60-40	40.0	36.0	RAP-157-C

Standard Grade Corning 7980 1-D (Fused Silica)

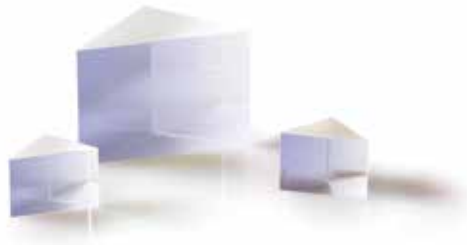
*Surface Figure	Surface Quality	A (mm)	Clear Aperture B (mm) min	PART NUMBER
$< \lambda/10$	10-5	10.0	8.0	RAP-040-UV
$< \lambda/10$	10-5	12.7	10.8	RAP-050-UV
$< \lambda/10$	10-5	25.0	21.0	RAP-090-UV
$< \lambda/10$	10-5	25.4	21.6	RAP-100-UV

* Measured p-v at 633nm

PRECISION RIGHT-ANGLE BENDING & FOLDING PRISMS: P90-C, P90-UV, P180-C, P180-UV



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Specifications

Product Code: **P90-C, P90-UV, P180-C, P180-UV**

Optical Material: N-BK7 or Standard Grade Corning 7980 1-D (Fused Silica)

Dimensional Tolerance: +0/-0.25mm

Angular Deviation: ± 3 arc minutes

Chamfer: 0.35mm leg width at 45° nominal

Surface Figure:

N-BK7: $< \lambda/4$ p-v at 633nm before coating

Fused Silica: $< \lambda/10$ p-v at 633nm before coating

Surface Quality:

N-BK7: 20-10 scratch-dig per MIL-PRF-13830b

Fused Silica: 10-5 scratch-dig per MIL-PRF-13830b

Clear Aperture: $\geq 85\%$ of central dimension

Anti-reflection Coating:

Single wavelength: $R \leq 0.25\%$ per surface

Broadband: $R_{avg} \leq 0.50\%$ per surface

Adhesion and Durability: Per MIL-C-48497a

Damage Threshold:

Pulsed: 10 J/cm², 20ns, 20Hz at 1064nm

cw: 10 MW/cm² at 1064nm

P90 right-angle bending prisms utilize the inherent total internal reflection (TIR) at the hypotenuse to invert the image and achieve a 90° change in direction. P180 right-angle folding prisms utilize the inherent total internal reflection at the leg faces to achieve a 180° change in direction (i.e., retroreflection). Antireflection coatings are applied to maximize the overall throughput and reduce any back-reflection.

- ▶ Use P90 series 90° bending prisms as broadband, high energy 90° reflectors: CVI Laser Optics high energy AR and BBAR coatings can be applied to legs
- ▶ Use P180 series 180° folding prisms as broadband, high-energy retroreflectors: CVI Laser Optics high energy AR and BBAR coatings can be applied to hypotenuse
- ▶ Aluminized hypotenuse with black overcoat, other dimensions or wavelengths available for OEM applications

BUILD YOUR PART NUMBER

STEP-1	STEP-2	STEP-3	STEP-4
PRODUCT CODE	SIZE CODE	AR COATING WAVELENGTH (nm)	MATERIAL CODE
P90	050	1064	C

EXAMPLE: P90 - 050 - 1025 - C

CHOOSE FROM THE OPTIONS BELOW.

1. PRODUCT CODE

P90	90° bending prism
P180	180° folding prism

2. SIZE CODE DIMENSION A (mm) (Theoretical Sharp)

050	12.7
100	25.4

3. WAVELENGTH OF AR COATING (nm)

193*	266*	532	1064
248*	355*	633	1050-1600
248-355*	415-700	632-1064	1500

4. MATERIAL CODE

MATERIAL CODE	MATERIAL
C	N-BK7
UV	Standard Grade Corning 7980 1-D (Fused Silica)

Please see page T-31 for Anti-reflection Coating Traces.

*Only available in Standard Grade Corning 7980 1-D (Fused Silica).



PELLIN BROCA PRISMS: PLBC



Specifications

Product Code: **PLBC**

Optical Material: Heraeus Suprasil 1 or Crystal Quartz

Dimensional Tolerance: $+0/-0.25\text{mm}$

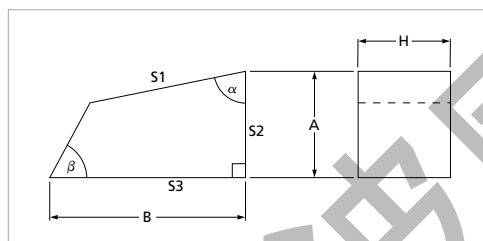
Angular Deviation: $\alpha: \pm 30 \text{ arc min}$ $\beta: \pm 2^\circ$

Chamfer: 0.35mm leg width at 45° nominal

Surface Figure: $< \lambda/10$ p-v at 633nm

Surface Quality: 10-5 scratch-dig on three polished surfaces per MIL-PRF-13830b

Clear Aperture: $\geq 85\%$ of central dimension



PLBC Pellin Broca prism

In a Pellin Broca prism, an ordinary dispersing prism is split in half along the bisector of the apex angle. Using a right-angle prism, the two halves are joined to create a dispersing prism with an internal right angle bend obtained by total internal reflection. See Figure 1.

A simple dispersing prism always deviates the longer wavelength less than the shorter wavelength. In a Pellin Broca prism, whether the longer wavelength is deviated more or less depends on the orientation of the prism. This is an important consideration when designing a high power Pellin Broca beam separator. This is illustrated in Figures 2 and Figures 3.

- ▶ Ideal for 90° wavelength deviation or beam separation
- ▶ Suprasil 1 for 180 to 240nm region
- ▶ Crystal quartz is specifically designed for high power Q-switched 266nm laser pulses above fluence levels of 50 mJ/cm^2

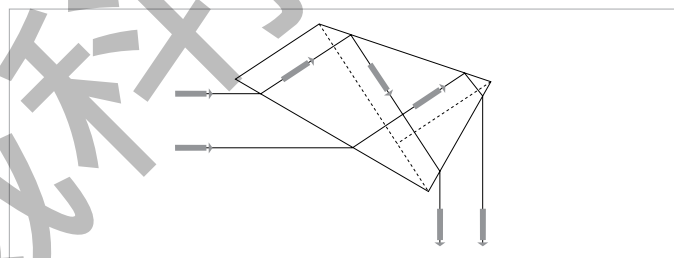


Figure 1. One of the wavelengths deviates by exactly 90° to its initial direction

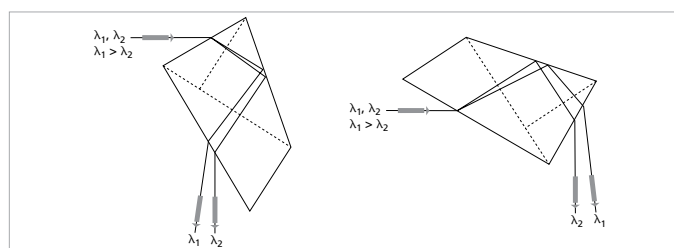


Figure 2. Whether the longer wavelength is deviated more or less depends on the orientation of the prism.

PELLIN BROCA PRISMS

Optical Material	A (mm)	B (mm)	H (mm)	Clear Aperture (mm)	α	PART NUMBER
Suprasil 1	11.0	20.0	6.4	5.0	79.5°	PLBC-5.0-79.5-SS
Crystal Quartz	23.5	40.0	12.7	10.0	77.2°	PLBC-10.0-77.2-CQ