Prisms

Prisms INDEX

Prisms Selection Guide

By processing the various forms of glass, the prism produces a special effect due to refraction. Since there is no angular offset that after manufacture, it is also used as a reference angle for accurate angle.

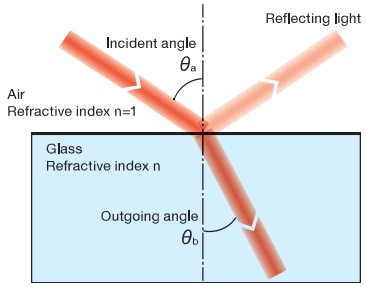
Application	Products		Sample of use
Reflecting light		**Right Angle Prisms (RPB / RPSQ)** Reference B266	Substitute of the mirror, Reflector of the compact optical system.
Replacing the light		**Corner Cube Prisms (CCB)** Reference B272 **Hollow Retro-reflectors (RCCB)** Reference B273	Interferometer, Reflector, such as distance measurement
Dispersion wavelength		**Equilateral Dispersing Prisms (DPB/DPSQ/DPTIH11)** Reference B274	Spectroscopic measurement, Dispersion compensation
Special effects		**Dove Prisms (DOP)** Reference B276 **Penta Prisms (PPB)** Reference B277 **Pellin–Broca prism (PBPQ)** Reference B278	Rotate or flip the image

About Refraction and Critical angle

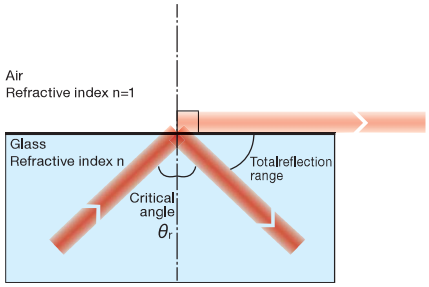
When the light is incident oblique angle on the glass, causing the refracted at the interface of the glass and air, the traveling direction of the light will change.
At this time, emission angle toward the side of the glass is smaller than the incident angle of the air.
If the refractive index of the glass can be seen, this relationship can be determined from Snell's law.

Then, even if the incident light is emitted at the same angle as the angle θ_b shown below the boundary surface of the glass, through the same path at all, it will be emitted to the air incident angle θ_a.
However, if it will be incident at a large angle with the boundary surface from the side of the glass, then emitted to the air-side angle will exceed 90 degrees. It is called "critical" the emission angle of the air side when 90 degrees. It is called to be this angle "critical angle".
When the incident light from the glass boundary at an angle larger the critical angle θ_r, the light will not come out to the air causing total reflection.

Conditions for refraction



Conditions for Critical



Snell's law

$$\sin \theta_a = n \sin \theta_b$$

Conditions for Critical angle

$$\sin 90° = n \sin \theta_r$$

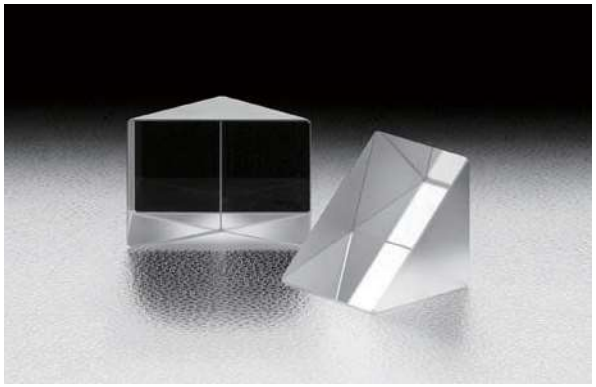
	BK7	Synthetic fused silica
Refractive index n_d	1.517	1.458
Critical angle θ_r	41.2°	43.3°

Coated Right Angle Prisms | RPB1 – 5

RoHS

**Right-angle prism can be used as a substitute for the mirror.
Independent even without a special holder, and since the choice of a variety of installation methods, it is useful if you want to reduce the size of the device.
In addition, with very high accuracy and precision angle of the prism surface, it can also be used by directly bonding it to machined parts.**

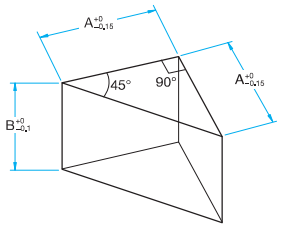
- RPB1 to 3 are used as a substitute for the mirror reflection of the slope.
  RPB1 is coated with anti-reflection coating with two surfaces which the light is incident and emitted by using the critical angle prism reflection of the slope and the surface.
  RPB2 are coated with reflective coating (Al+MgF_2) on the surface of slope.
  RPB3 is the product which does not pass through the light reflected by the inclined surface of the interior of the prism, and there are three types.
- RPB4 can be used when you want to use the reflection of the two surfaces sandwiching the apex angle (right angle).
  RPB4 can be used as to when observe two opposite directions at the same time, or as a prototype orthogonal basis and so on.
- RPB5 are used in applications where light back at the same angle as the incident light with respect to the horizontal direction.
  And double pass interferometer is used in (such as self-correlator) auto correlator.



Specifications

Material	BK7 (Refractive index n_d=1.517)
Surface flatness of substrate	λ/4
Angle tolerance	±1′ (90° or 45°)
Coating	Broadband multi-layer AR coating Visible Protected Aluminum (Al+MgF_2)
Wavelength Range	400 – 700nm
Surface Quality (Scratch–Dig)	40–20
Clear aperture	90% of Circle or Ellipse to Actual dimension for entrance and exit surface

Outline Drawing (in mm)



Chamfer Ridge line
<C0.2 (A≦15)
<C0.3 (20≦A)

Guide

- For custom sizes and wavelengths not listed on-line or in our catalog please contact our Sales Division with your requests.
- Prisms are also available uncoated. Reference B268

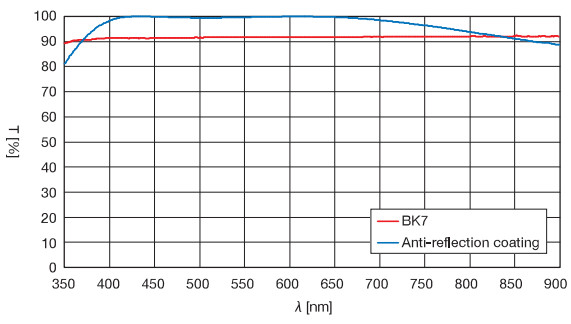
Attention

- A dimension measured is slightly shorter than the catalog size because it contains chamfer dimension. Dimensional tolerances are defined by the sides of the triangle with the slope and two bottom surface.
- If the light is incident on the slope from the air side, most of the light through the prism side and it reflects only part of the light.
- If the incident light at an incident angle of 41 degrees or less (less than the critical angle) from the side of the glass which is no coating on the surface, will not be total reflection but part of the light is transmitted through the air side.
- Sometimes when dirt or fingerprints on the surface with no coating, total reflection will not happen any more than the critical angle. Do not contact anything on the no coated surface.
- Please use RPB5 in the range of 0±5.7 degrees for the slope. Beyond this range, it will not be totally reflected.
- RPB2 are also reflected at an angle smaller than the critical angle by Al coating, but the reflectance will be lower to 12% less than the RPB1.

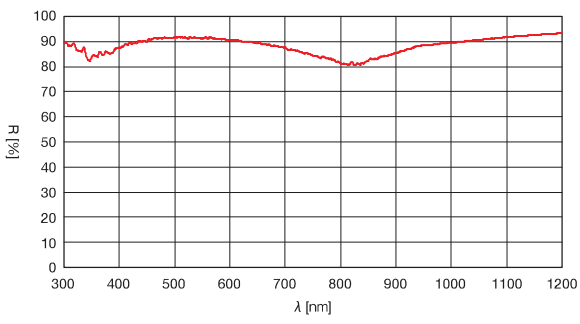
Typical Transmittance Data & Typical Reflectance Data

T: Transmission R: Reflectance

The transmittane and the Anti-reflection effect of BK7



Al+MgF_2

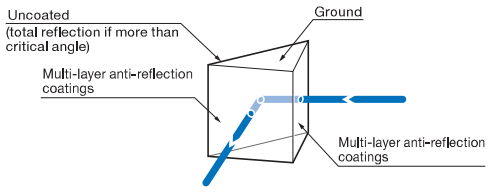


Compatible Optic Mounts

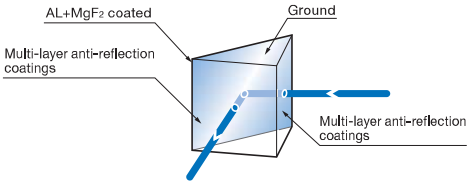
PLH / KKD / SHA

Schematic

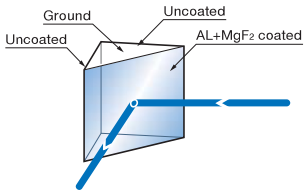
RPB1



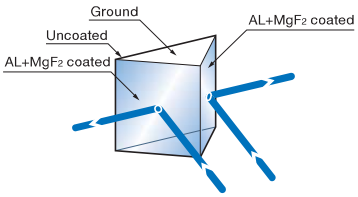
RPB2



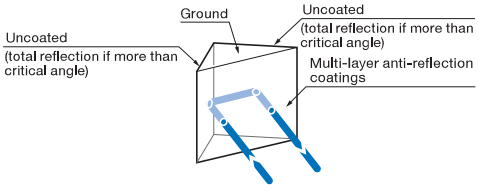
RPB3



RPB4



RPB5



45° with a coat

Part Number	A = B [mm]	Laser Damage Threshold* [J/cm²]
RPB1-05-550	5	4
RPB1-07-550	7	4
RPB1-10-550	10	4
RPB1-12.7-550	12.7	4
RPB1-15-550	15	4
RPB1-20-550	20	4
RPB1-25-550	25	4
RPB1-25.4-550	25.4	4
RPB1-30-550	30	4
RPB2-05-550	5	0.25
RPB2-07-550	7	0.25
RPB2-10-550	10	0.25
RPB2-12.7-550	12.7	0.25
RPB2-15-550	15	0.25
RPB2-20-550	20	0.25
RPB2-25-550	25	0.25
RPB2-25.4-550	25.4	0.25
RPB2-30-550	30	0.25
RPB3-05-550	5	0.25
RPB3-07-550	7	0.25
RPB3-10-550	10	0.25
RPB3-12.7-550	12.7	0.25
RPB3-15-550	15	0.25
RPB3-20-550	20	0.25
RPB3-25-550	25	0.25
RPB3-25.4-550	25.4	0.25
RPB3-30-550	30	0.25
RPB4-05-550	5	0.25
RPB4-07-550	7	0.25
RPB4-10-550	10	0.25
RPB4-12.7-550	12.7	0.25
RPB4-15-550	15	0.25
RPB4-20-550	20	0.25
RPB4-25-550	25	0.25
RPB4-25.4-550	25.4	0.25
RPB4-30-550	30	0.25
RPB5-05-550	5	4
RPB5-07-550	7	4
RPB5-10-550	10	4
RPB5-12.7-550	12.7	4
RPB5-15-550	15	4
RPB5-20-550	20	4
RPB5-25-550	25	4
RPB5-25.4-550	25.4	4
RPB5-30-550	30	4

* Laser pulse width 10ns, repetition frequency 20Hz

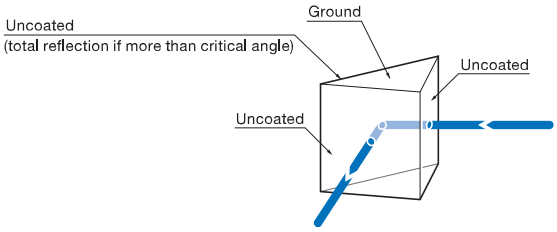
Right Angle Prisms | RPB/RPSQ

RoHS

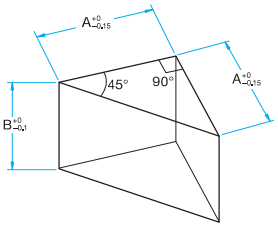
Right angle prism which are not coated can be used in various applications, such as total internal reflection critical angle and wavelength dispersion. In addition,various coatings are available to produce a prism optical element at a specific wavelength(s) to meet the application needs of customers.

- The prisms are available made with synthetic quartz for use in the ultraviolet wavelength range and BK7 that can be used for visible to infrared range.
- With very high accuracy and precision angles of the prism surface, it can also be used directly bonded to machined parts.
- With many mounting methods right angle prisms are very useful as a substitute for a small mirror.

Schematic



Outline Drawing (in mm)



Chamfer Ridge line
Not chamfered (A≦4)
<C0.2 (5≦A≦15)
<C0.3 (20≦A≦30)
<C0.5 (40≦A)

Specifications

Material	BK7 (Refractive Index n_d=1.517) Synthetic fused silica (Refractive Index n_d=1.458)
Clear aperture	90% of Circle or Ellipse to Actual dimension for entrance and exit surface

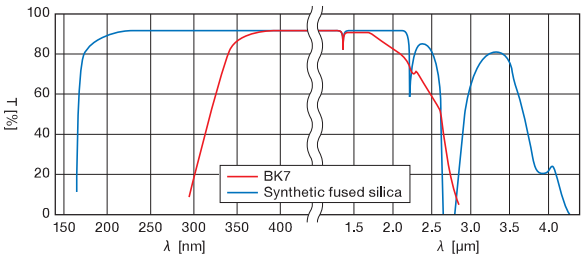
Guide

- Contact our Sales Division with your request for custom prisms not listed on our website or in the catalog.
- Production of high-precision prism and high angle accuracy are also available.

Attention

- A dimension measured is slightly shorter than the catalog size because it contains chamfer dimension. Dimensional tolerances are defined by the sides of the triangle with the slope and two bottom surface.
- Surface reflectance of the critical angle is nearly 100% reflection. However, the reflectivity of the surface that emits or incident on the glass has a loss of about 8 percent.
- Most of the light through the prism side, if the light is incident on the slopes from the air it will not be reflected only partially.
- In BK7, when the incident light at an angle of 41 degrees or less (less than the critical angle) from the side of the glass, it will not be a total reflection on the part of the light is transmitted through the air for the slope in BK7. In synthetic fused silica at an angle of incidence of 43 degrees or less (less than the critical angle) will not be a total internal reflection.
- Sometimes when dirt or fingerprints on the surface with no coating, total reflection will not happen anymore at the critical angle. Do not contact anything on the no coated surface.

Typical Transmittance Data T: Transmission



BK7 / Standard

Part Number	A = B [mm]	Surface flatness of substrate	Angle tolerance 90°	Angle tolerance 45°	Surface Quality (Scratch–Dig)
RPB-01-4M	1	λ/4	±1′	±1′	10–5
RPB-02-4M	2	λ/4	±1′	±1′	10–5
RPB-03-4M	3	λ/4	±1′	±1′	10–5
RPB-04-4M	4	λ/4	±1′	±1′	10–5
RPB-05-4M	5	λ/4	±1′	±1′	10–5
RPB-07-4M	7	λ/4	±1′	±1′	10–5
RPB-10-4M	10	λ/4	±1′	±1′	10–5
RPB-12.7-4M	12.7	λ/4	±1′	±1′	10–5
RPB-15-4M	15	λ/4	±1′	±1′	10–5
RPB-20-4M	20	λ/4	±1′	±1′	10–5
RPB-25-4M	25	λ/4	±1′	±1′	10–5
RPB-25.4-4M	25.4	λ/4	±1′	±1′	10–5
RPB-30-4M	30	λ/4	±1′	±1′	10–5
RPB-40-4M	40	λ/4	±1′	±1′	10–5
RPB-50-4M	50	λ/4	±1′	±1′	10–5

Compatible Optic Mounts

PLH / KKD / SHA

BK7 / Simple

Part Number	A = B [mm]	Surface flatness of substrate	Angle tolerance 90°	Angle tolerance 45°	Surface Quality (Scratch–Dig)
RPB-01-2L	1	λ/2	±3′	±3′	20–10
RPB-02-2L	2	λ/2	±3′	±3′	20–10
RPB-03-2L	3	λ/2	±3′	±3′	20–10
RPB-04-2L	4	λ/2	±3′	±3′	20–10
RPB-05-2L	5	λ/2	±3′	±3′	20–10
RPB-07-2L	7	λ/2	±3′	±3′	20–10
RPB-10-2L	10	λ/2	±3′	±3′	20–10
RPB-15-2L	15	λ/2	±3′	±3′	20–10
RPB-20-2L	20	λ/2	±3′	±3′	20–10
RPB-25-2L	25	λ/2	±3′	±3′	20–10
RPB-30-2L	30	λ/2	±3′	±3′	20–10
RPB-40-2L	40	λ/2	±3′	±3′	20–10
RPB-50-2L	50	λ/2	±3′	±3′	20–10

BK7 / High-precision

Part Number	A = B [mm]	Surface flatness of substrate	Angle tolerance 90°	Angle tolerance 45°	Surface Quality (Scratch–Dig)
RPB-05-10H	5	λ/10	±5″	±30″	10–5
RPB-07-10H	7	λ/10	±5″	±30″	10–5
RPB-10-10H	10	λ/10	±5″	±30″	10–5
RPB-15-10H	15	λ/10	±5″	±30″	10–5
RPB-20-10H	20	λ/10	±5″	±30″	10–5
RPB-25-10H	25	λ/10	±5″	±30″	10–5
RPB-30-10H	30	λ/10	±5″	±30″	10–5
RPB-40-10H	40	λ/10	±5″	±30″	10–5
RPB-50-10H	50	λ/10	±5″	±30″	10–5

Synthetic fused silica / Standard

Part Number	A = B [mm]	Surface flatness of substrate	Angle tolerance 90°	Angle tolerance 45°	Surface Quality (Scratch–Dig)
RPSQ-05-4M	5	λ/4	±1′	±1′	10–5
RPSQ-07-4M	7	λ/4	±1′	±1′	10–5
RPSQ-10-4M	10	λ/4	±1′	±1′	10–5
RPSQ-12.7-4M	12.7	λ/4	±1′	±1′	10–5
RPSQ-15-4M	15	λ/4	±1′	±1′	10–5
RPSQ-20-4M	20	λ/4	±1′	±1′	10–5
RPSQ-25-4M	25	λ/4	±1′	±1′	10–5
RPSQ-25.4-4M	25.4	λ/4	±1′	±1′	10–5
RPSQ-30-4M	30	λ/4	±1′	±1′	10–5

Synthetic fused silica / Simple

Part Number	A = B [mm]	Surface flatness of substrate	Angle tolerance 90°	Angle tolerance 45°	Surface Quality (Scratch–Dig)
RPSQ-05-2L	5	λ/2	±3′	±3′	20–10
RPSQ-07-2L	7	λ/2	±3′	±3′	20–10
RPSQ-10-2L	10	λ/2	±3′	±3′	20–10
RPSQ-15-2L	15	λ/2	±3′	±3′	20–10
RPSQ-20-2L	20	λ/2	±3′	±3′	20–10
RPSQ-25-2L	25	λ/2	±3′	±3′	20–10
RPSQ-30-2L	30	λ/2	±3′	±3′	20–10
RPSQ-40-2L	40	λ/2	±3′	±3′	20–10
RPSQ-50-2L	50	λ/2	±3′	±3′	20–10

Synthetic fused silica / High-precision

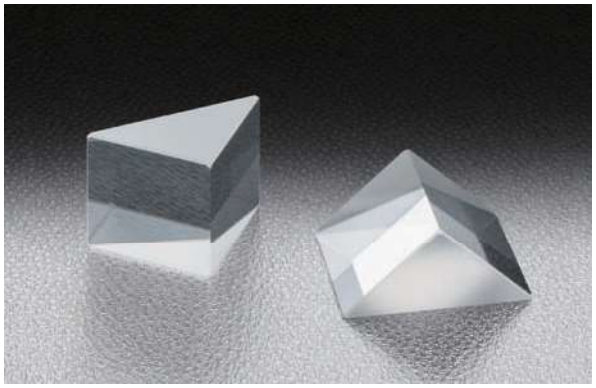
Part Number	A = B [mm]	Surface flatness of substrate	Angle tolerance 90°	Angle tolerance 45°	Surface Quality (Scratch–Dig)
RPSQ-05-10H	5	λ/10	±5″	±30″	10–5
RPSQ-07-10H	7	λ/10	±5″	±30″	10–5
RPSQ-10-10H	10	λ/10	±5″	±30″	10–5
RPSQ-15-10H	15	λ/10	±5″	±30″	10–5
RPSQ-20-10H	20	λ/10	±5″	±30″	10–5
RPSQ-25-10H	25	λ/10	±5″	±30″	10–5
RPSQ-30-10H	30	λ/10	±5″	±30″	10–5

Knife Edge Right Angle Prisms | KRPB

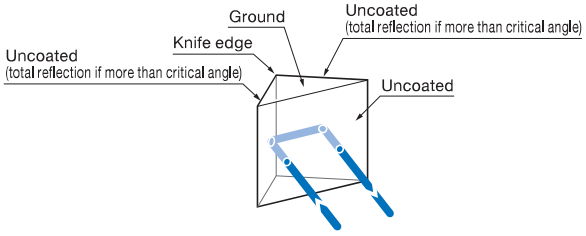
RoHS Catalog Code W3125

The knife edge prism is polished to the sharp edges of the right angle surfaces and have no chamfers on these edges.

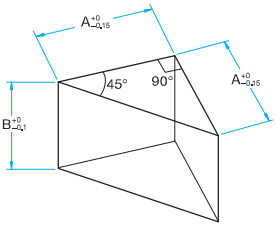
- With knife edge prism having no coating (KRPB) by using light in the range of 0±5.7 degrees angle of incidence to the slope surface the total reflection critical angle is obtained.



Schematic



Outline Drawing (in mm)



Chamfered, the entire circumference of the ridge crest except right angles
<C0.2 (A≦15)
<C0.3 (20≦A)

Specifications

Material	BK7 (Refractive Index n_d=1.517)
Ridge Processing	Right-angle ridge: Knike edge (Not chamfered) Other ridge: Chamfered
Clear aperture	90% of Circle or Ellipse to Actual dimension for entrance and exit surface

Guide

- Contact our Sales Division with your request for custom prisms not listed on our website or in the catalog.

Attention

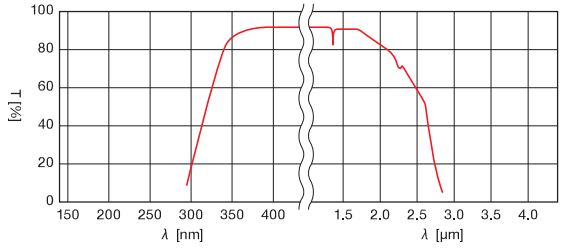
- Knife-edge ridge right angle is very easyly damaged so please carefully handled.
- The knife edge will not be able to be cleaned with lens paper. Use an air blower to remove small dust particles.
- A dimension measured is slightly shorter than the catalog size because it contains chamfer dimension. Dimensional tolerances are defined by the sides of the triangle with the slope and two bottom surface.
- KRPB (with a no coat), the reflectance of the reflection above the critical angle is nearly 100%, there is a loss of about 8% in the reflection of the input and the exit surface of the prism.
- Sometimes when dirt or fingerprints on the surface with no coating, total reflection will not happen anymore at the critical angle. Do not contact anything on the no coated surface.

Specifications

Part Number	A = B [mm]	Surface flatness of substrate	Angle tolerance 90°	Angle tolerance 45°	Surface Quality (Scratch–Dig)
KRPB-10-4M	10	λ/4	±1′	±1′	10–5
KRPB-15-4M	15	λ/4	±1′	±1′	10–5
KRPB-20-4M	20	λ/4	±1′	±1′	10–5
KRPB-25-4M	25	λ/4	±1′	±1′	10–5
KRPB-30-4M	30	λ/4	±1′	±1′	10–5
KRPB-10-10H	10	λ/10	±5″	±30″	10–5
KRPB-15-10H	15	λ/10	±5″	±30″	10–5
KRPB-20-10H	20	λ/10	±5″	±30″	10–5
KRPB-25-10H	25	λ/10	±5″	±30″	10–5
KRPB-30-10H	30	λ/10	±5″	±30″	10–5

Typical Transmittance Data T: Transmission

Transmittance Data for BK7



Compatible Optic Mounts

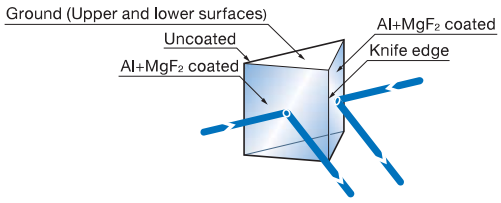
PLH / KKD / SHA

Knife Edge Right Angle Prisms (with a Coat) | KRPB4 RoHS Catalog Code W3125

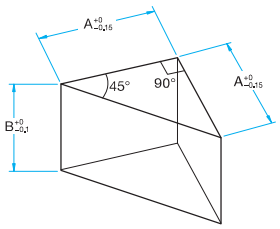
The knife edge prism is polished to the sharp edges of the right angle surfaces and have no chamfers on these edges.

- With knife edge prism having no coating (KRPB) by using light in the range of 0±5.7 degrees angle of incidence to the slope surface the total reflection critical angle is obtained.

Schematic



Outline Drawing (in mm)



Chamfered, the entire circumference of the ridge crest except right angles
<C0.2 (A≦15)
<C0.3 (20≦A)

Specifications

Material	BK7 (Refractive Index n_d=1.517)
Ridge Processing	Right-angle ridge: Knike edge (Not chamfered) Other ridge: Chamfered
Coating	2-surface that make up the right angle: Al+MgF_2 (Protected Aluminum), Obliquity: Uncoating
Laser Damage Threshold	0.25J/cm^2 (Laser pulse with 10ns, repetition frequency 20Hz)
Clear aperture	90% of Circle or Ellipse to Actual dimension for entrance and exit surface

Guide

- Contact our Sales Division with your request for custom prisms not listed on our website or in the catalog.

Attention

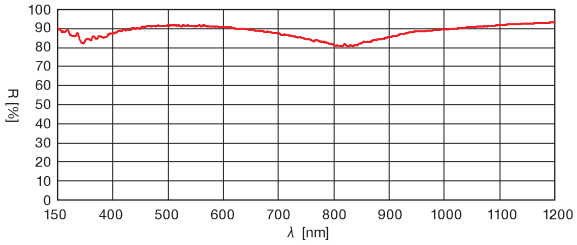
- Knife-edge ridge right angle is very easyly damaged so please carefully handled.
- The knife edge will not be able to be cleaned with lens paper. Use an air blower to remove small dust particles.
- A dimension measured is slightly shorter than the catalog size because it contains chamfer dimension. Dimensional tolerances are defined by the sides of the triangle with the slope and two bottom surface.
- KRPB (with a no coat), the reflectance of the reflection above the critical angle is nearly 100%, there is a loss of about 8% in the reflection of the input and the exit surface of the prism.
- Sometimes when dirt or fingerprints on the surface with no coating, total reflection will not happen anymore at the critical angle. Do not contact anything on the no coated surface.

Specifications

Part Number	A = B [mm]	Surface flatness of substrate	Angle tolerance 90°	Angle tolerance 45°	Surface Quality (Scratch–Dig)
KRPB4-10-550	10	λ/4	±1′	±1′	40–20
KRPB4-15-550	15	λ/4	±1′	±1′	40–20
KRPB4-20-550	20	λ/4	±1′	±1′	40–20
KRPB4-25-550	25	λ/4	±1′	±1′	40–20
KRPB4-30-550	30	λ/4	±1′	±1′	40–20

Typical Reflectance Data R: Reflectance

Reflectance Data for Al+MgF_2



Compatible Optic Mounts

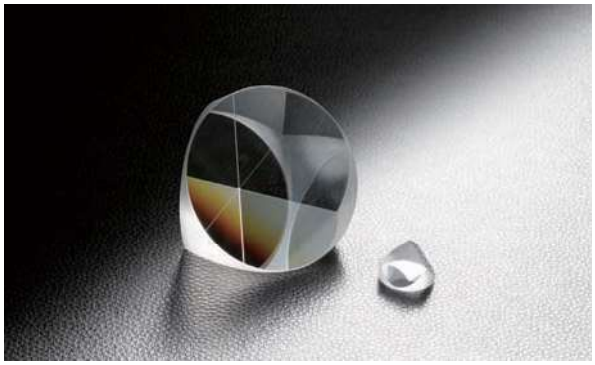
PLH / KKD / SHA

Corner Cube Prisms | CCB

RoHS Catalog Code W3126

Retro-reflectors, or corner cubes as they are sometimes called, have the property that light incident on the face of the prism is deviated by 180 degrees independently of its angle of incidence. This means that any light incident on the surface will be reflected back along the same path that it came from. These retro-reflectors are extremely precise providing an exact 180 degree deviation within a 5arcsec tolerances. This enables them to be used for high precision applications or with lasers over very long distances. These angle insensitive; mirrors have numerous uses in alignment and metrology. Our retro-reflectors are available uncoated or with a visable broadband AR coating on the face.

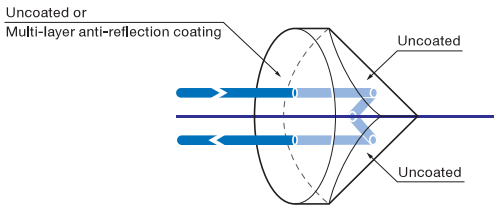
- The corner cube is fabricated under high precision process to assure the reflection of high accuracy light.
- Light entering the corner cube reflects off each of the three surfaces and the emerging light is parallel to the entrance beam.
- We also offer CCB-M option with an anti-reflection coating to minimize light power loss.



Specifications

Material	BK7
Wavefront distortion on the side of the aperture	λ/4
Angular deviation of beam	<5″
Coating	CCB: Uncoated CCB-M: Broadband multi-layer AR coating for Visible (BMAR)
Incident angle	±20° (Range obtained by Total reflection Critical Angle)
Surface Quality (Scratch–Dig)	40–20
Clear aperture	90% of actual aperture

Schematic



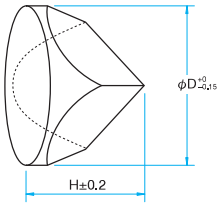
Guide

▶We also offer hollow retro-reflector (RCCB) which can assure incident angle of 20 degrees without change in reflection light power. Reference B273

Attention

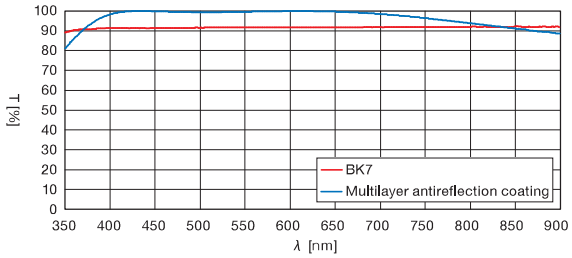
▶Light entering the corner cube reflects off each of the three surfaces and the emerging light is parallel to the entrance beam.
▶To reduce the affects of polarizaton, we recommand the use of a hollow retroreflector (RCCB). Reference B273

Outline Drawing (in mm)



Chamfer Ridge line
<C0.2 (A≦15)
<C0.3 (20≦A≦30)
<C0.5 (40≦A)

Typical Transmittance Data T: Transmission



Uncoated

Part Number	Diameter ϕD [mm]	Height H [mm]
CCB-10	ϕ10	8.6
CCB-15	ϕ15	11.4
CCB-20	ϕ20	15.6
CCB-25	ϕ25	19.0
CCB-30	ϕ30	22.7
CCB-50	ϕ50	36.5

Multi-layer anti-reflection coating

Part Number	Diameter ϕD [mm]	Height H [mm]	Laser Damage Threshold* [J/cm²]
CCB-10M	ϕ10	8.6	4
CCB-15M	ϕ15	11.4	4
CCB-20M	ϕ20	15.6	4
CCB-25M	ϕ25	19.0	4
CCB-30M	ϕ30	22.7	4
CCB-50M	ϕ50	36.5	4

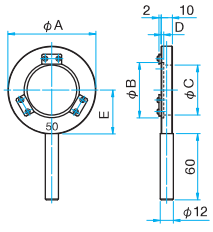
* Laser pulse width 10ns, repetition frequency 20Hz

Corner Cube Prism Holders | KUA

Catalog Code W3127

We offer holders to mount each of our catalog corner cubes, consult our Sales Divsion for assistance in your selection.

KUA
M6 P1



Specifications

Part Number	Parts of assembled optics	Diameter ϕA [mm]	Optics aperture ϕB [mm]	Clear aperture ϕC [mm]	D [mm]	E [mm]	Weight [kg]
KUA-10	CCB-10	ϕ42	ϕ10	ϕ8	1.0	20	0.07
KUA-15	CCB-15	ϕ42	ϕ15	ϕ12	1.2	20	0.08
KUA-20	CCB-20	ϕ52	ϕ20	ϕ17	1.5	25	0.09
KUA-25	CCB-25	ϕ52	ϕ25	ϕ22	1.4	25	0.10
KUA-30	CCB-30	ϕ62	ϕ30	ϕ27	2.0	30	0.12
KUA-50	CCB-50	ϕ82	ϕ50	ϕ45	2.0	40	0.14

The hollow retro-reflector is similar to the corner cube; it reflects the incident light back to its original source. This is made of a high precision assembly of 3 flat mirrors; insensitive to chromatic dispersion of the refractive index of glass and the absorptive of glass.

- The hollow is fabricated under high precision process; it can assure the reflection of high accuracy light.
- Can be used at broad wavelength range from UV to IR.
- Since there is no glass chromatic dispersion, the position of the back incident beam does not change with wavelength.
- With a small polarization effects, it is recommended to use in multiple interferometer optical path.

Specifications

Material	BK7
Material of frame	Aluminum Finishing: Black anodized
Coating	Aluminum (No Protected Coating)
Laser Damage Threshold	0.25J/cm^2 (Laser pulse with 10ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	40–20

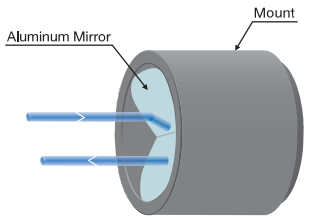
Guide

- We offer holders to mount each of our catalog hollow retro-reflector, consult our Sales Division for assistance in your selection.
- For high reflective type, we are proposing the corner cube CCB. Reference B272

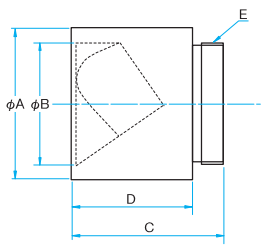
Attention

- The corner cube reflects light back to its source at high precision. If the incident light position is deviated from the incident center; the reflected light will also be deviated at the similar distance.
- Reflection on aluminum mirror may have some polarization effects. Also, direction of polarization will be twisted by the 3 times reflection, and will rotate 60deg.
- Avoid using optical cleaning tissue for the surface cleaning; there is no protection layer on the top of the aluminum coating. Please use air-blow type of cleaner.
- The reflectance of the aluminum coating is about 85% to 90%. Therefore the light reflectance performance after reflecting off 3 surfaces is 61% to 73%.

Schematic



Outline Drawing (in mm)

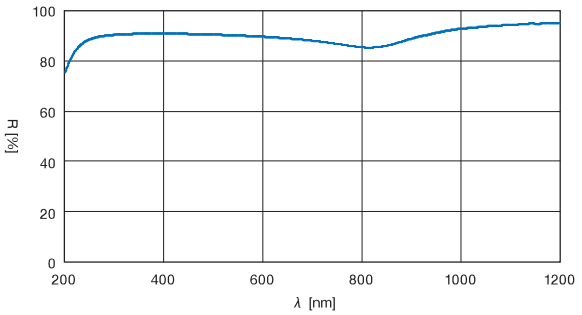


●Tolerance ±0.2

Part Number	ϕA [mm]	ϕB [mm]	C [mm]	D [mm]	E
RCCB-10	ϕ13	ϕ10	18	13	M10.85 P0.75
RCCB-20	ϕ25	ϕ20	25	20	M20.85 P0.75
RCCB-30	ϕ35	ϕ30	35	30	M30.85 P0.75

Typical Transmittance Data R: Reflectance

Reflectance Data for Aluminum (surface reflection)



Specifications

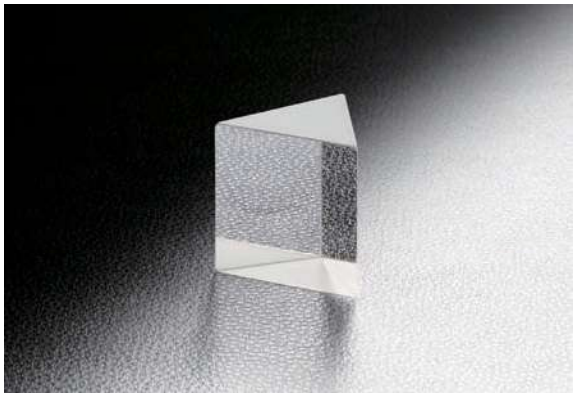
Part Number	Clear aperture [mm]	Angular deviation of beam [″]	Reflected wavefront distortionn
RCCB-10-10	ϕ8	<10	1λ
RCCB-10-30	ϕ8	<30	2λ
RCCB-20-5	ϕ18	<5	1λ
RCCB-20-30	ϕ18	<30	2λ
RCCB-30-5	ϕ27	<5	1λ
RCCB-30-30	ϕ27	<30	2λ

Equilateral Dispersing Prisms | DPB/DPSQ/DPTIH11

RoHS

Equilateral prisms are normally used for the dispersion of light into its different colors. Light incident at an oblique angle to the first face is dispersed according to its wavelength and emerges as a spectrum from the opposite face. We offer these prisms made from BK7, Synthetic Fused Silica adn S-TIH11 optical glass.

- The roof angle of 60 degrees causes the best combination of wide dispersion and low reflection losses. A glass with large dispersive power or small Abbe's number leads to large angular dispersion.
- We offer both BK7 and fused silica for wavelengths from UV to near IR. We recommend a prism of BK7 if the light is not UV, because the angular dispersion of BK7 is larger than that of fused silica.
- The DPTIH11 uses high index glass resulting in superior dispersion.



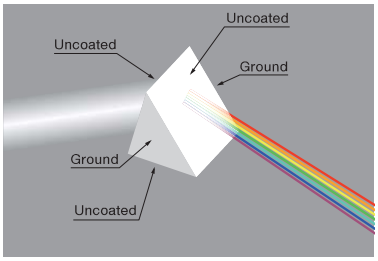
Specifications

Part Number	DPB	DPSQ	DPTIH11
Material	BK7	Synthetic fused silica	S-TIH11 equivalent
Refractive index n_d	1.517	1.458	1.785
Minimum deviation	49.3°	46.8°	66.4°
Abbe number ν_d*	64.1	67.8	25.7
Angle	60°±3′		
Surface flatness of substrate	λ/10		λ/4
Surface Quality (Scratch–Dig)	20–10		40–20
Clear aperture	Circle or ellipse inscribed in a rectangular of 90% of the dimensions A and B		

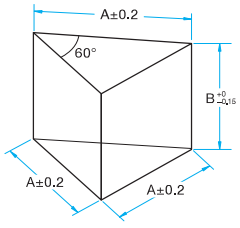
* Abbe number $\nu_d = \frac{n_d - 1}{n_F - n_C}$

n_d: Refractivity of 587.6nm wavelenght
n_F: Refractivity of 486.1nm wavelenght
n_C: Refractivity of 656.3nm wavelenght

Schematic



Outline Drawing (in mm)



Chamfer Ridge line <C0.3

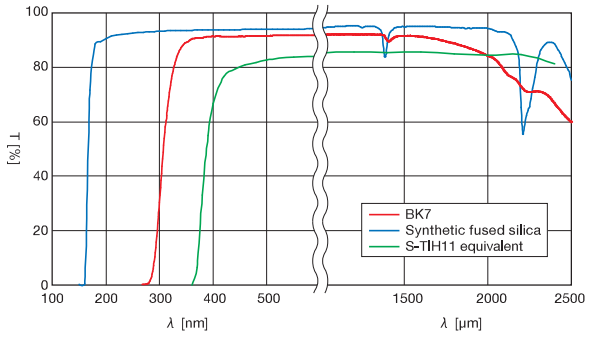
Guide

- We offer Prism Holders (PLH) to mount each of our catalog equilateral dispersing prisms. WEB Reference Catalog Code W4025
- Consult our Sales Division for custom sizes.

Attention

- Every edge of these prisms is chamfered (beveled) for chipping prevention. The dimensions of these prisms are values not including chamfer.
- Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.

Typical Transmittance Data T: Transmission



BK7	
Part Number	A = B [mm]
DPB-20-10H	20
DPB-25-10H	25
DPB-30-10H	30

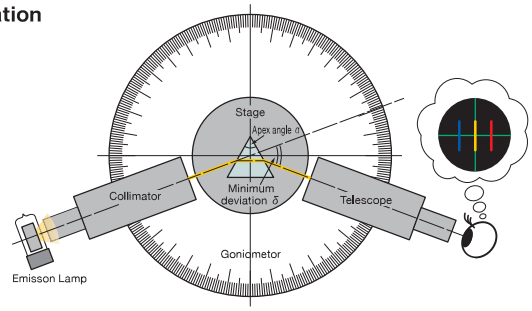
Synthetic fused silica	
Part Number	A = B [mm]
DPSQ-20-10H	20
DPSQ-25-10H	25
DPSQ-30-10H	30

S-TIH11	
Part Number	A = B [mm]
DPTIH11-20-4H	20
DPTIH11-25-4H	25
DPTIH11-30-4H	30

■Glass refractive index measurement method of minimum deviation

The refractive index of optical glass is accurately measured by the angle measuring device called a goniometer.
Accurately measuring the refractive index for each wavelength with the known wavelength of the emission spectrum of the lamp is emitted.
Wavelength dispersion of the refractive index is determined by the results of this measurement.

$$n = \frac{\sin\left(\frac{\alpha+\delta}{2}\right)}{\sin\left(\frac{\alpha}{2}\right)}$$



Compatible Optic Mounts

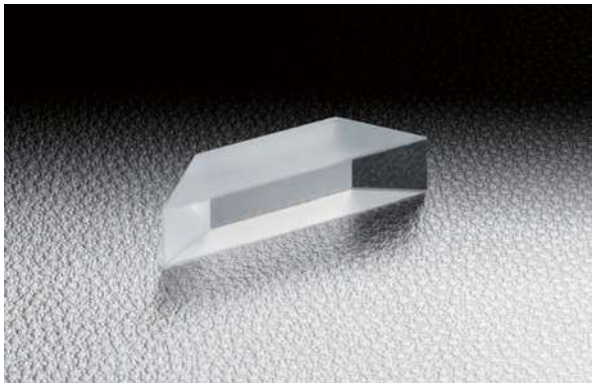
PLH / KKD / SHA

Dove Prisms | DOP

RoHS Catalog Code W3130

Dove prisms have the useful property that they completely invert an image by 180 degrees. If the prism is rotated about its axis the image will rotate at twice the rate of rotation of the prism. Dove prisms provide the most convenient and most precise method of rotating a beam and their long length and square profile make them easy to mount in a cylindrical sleeve. Because of the very limited field of view dove prisms need to be used with collimated or near-collimated beams. These prisms are offered with and without a broadband multilayer anti-reflective coating on the end faces. The hypotenuse face acts as a TIR surface and is therefore normally not coated. It is important, therefore, to keep this surface clean.

- Dove prisms uses a precision fabrication process to ensure minimal light incident axis deviation.
- We are offering high surface flatness at λ/4 for laser experimental use.



Specifications

Material	BK7 (n_d=1.517)
Inclination angle	45°±3′
Coating	DOP-4: Uncoated DOP-4M: Broadband multi-layer AR coating (400 – 700nm)
Surface Quality (Scratch–Dig)	20–10
Clear aperture	Circle or ellipse inscribed in a rectangular of 90% of the dimensions A and B

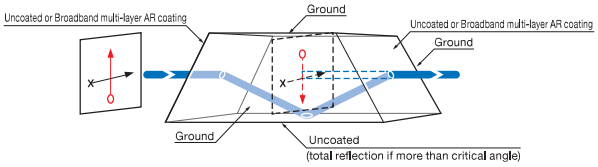
Guide

- AR coating on incident surface and emitting surface and aluminum coat on lower surface can be done as an option. Please consult our Sales Division for coatings suitable for your application.

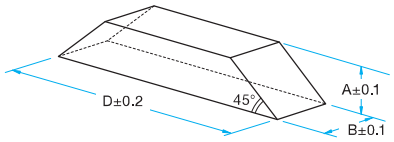
Attention

- When the prism is in the upright image position, the right and left side images exhibit mirror symmetry.
- The chromatic aberration may happen when observation of image at high magnification through the dove prism.
- The D side dimension is to the theoretical sharp edge. Actual measurement may be smaller due to the chamfer.
- The bottom uncoated surface should be clean of all dirt to minimize being displayed in the image.

Schematic

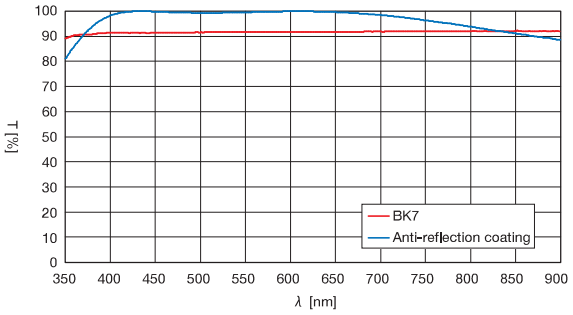


Outline Drawing (in mm)



Chamfer Ridge line
<C0.2 (A≦15)
<C0.3 (20≦A)

Typical Transmittance Data T: Transmission



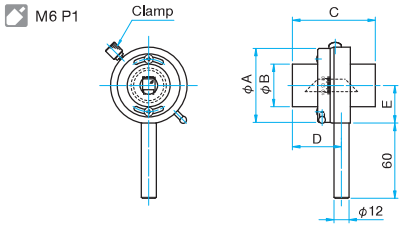
Specifications

Part Number	A = B [mm]	Length D [mm]	Surface flatness of substrate
DOP-10-4	10	42.2	λ/4
DOP-15-4	15	63.3	λ/4
DOP-20-4	20	84.4	λ/4
DOP-25-4	25	105.5	λ/4
DOP-30-4	30	126.6	λ/4
DOP-10-4M	10	42.2	λ/4
DOP-15-4M	15	63.3	λ/4
DOP-20-4M	20	84.4	λ/4
DOP-25-4M	25	105.5	λ/4
DOP-30-4M	30	126.6	λ/4

Dove Prism Holders | DBH

Catalog Code W3131

We offer holders to mount each of our catalog dove prisms with both rotational adjustment, consult our Sales Division for assistance in your selection.



Part Number	ϕA [mm]	ϕB [mm]	C [mm]	D [mm]	E [mm]
DBHN-10	ϕ60	ϕ34	66	41	30
DBH-30	ϕ94	ϕ64	152	80	46.5

Specifications

Primary material: Aluminum
Finish: Black Anodized

Part Number	Part number of optics included	Sensitivity [°]	Weight [kg]
DBHN-10	DOP-10-4	1	0.35
DBH-30	DOP-30-4	1	1.3

Penta Prisms
Brewster Dispersing Littrow Prism

PPB
Custom-made

RoHS
RoHS

PPB

Catalog Code W3132

Penta prisms deviate an input beam by 270 degrees (-90 degrees) independently of the angle of incidence on the first surface. They are therefore useful as precise right angle mirrors which are insensitive to alignment. These penta prisms find many metrological applications.

- These penta prisms are Anti-Reflection coated on the entrance and exit faces as well as being coated with an aluminum coating and black paint on the internal reflection faces.

Specifications

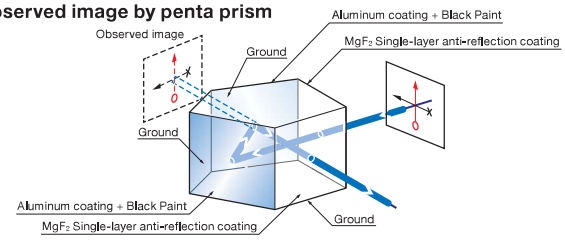
Material	BK7
Surface flatness of substrate	λ/4
Angle tolerance	±3′
Surface Quality (Scratch–Dig)	40–20
Coating	Aluminum coating + Black Paint MgF_2 Single-layer anti-reflection coating
Clear aperture	Circle inscribed in a square of 90% of the dimensions A

Attention

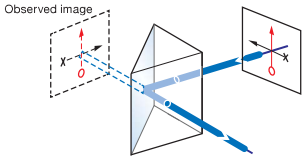
- Caution should be taken with cleaning to not use strong solvents on the black painted surface.
- There is a loss with Aluminum coating of about 12% in the single side, and 23% in both side internal reflection of prism resulting in input and output efficiency of about 77%.

Schematic

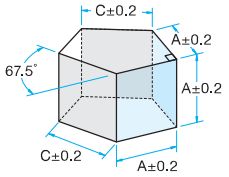
Observed image by penta prism



Observed image by right-angle prism (mirror symmetry)



Outline Drawing (in mm)



Chamfer Ridge line
C0.2 – C0.3
(No chamfer obtuse angle)

Specifications

Part Number	A [mm]	C [mm]
PPB-10-4	10	10.8
PPB-15-4	15	16.0
PPB-20-4	20	23.0
PPB-25-4	25	27.1

Custom-made

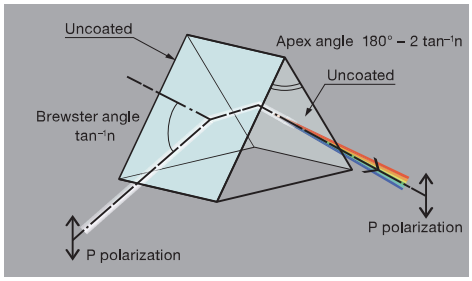
Catalog Code W3133

Brewster dispersing littrow prism incident angle of the prism can be adjusted so that the dispersion Brewster angle p-polarized light reflection angle is zero. It can be used as the wavelength selection prism used in the tunable laser resonator.

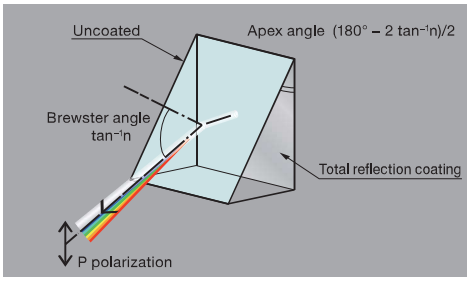
- If linearly polarized light (polarized light P), reflection loss is reduced for both the incident surface and the exit surface then high transmission efficiency can be obtained.
- Brewster angle is computed from the refractive index with wavelength of the glass material.
- When ordering, please use the Contact our Sales Division with your custom reques.

Schematic

Transparent type



Littrow type



Compatible Optic Mounts

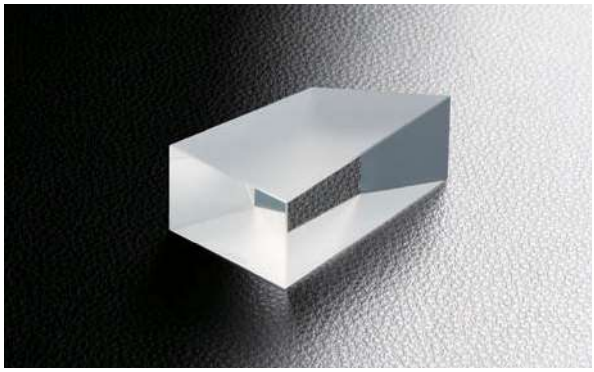
PLH / KKD / SHA

Pellin Broca Prism | PBPQ

RoHS Catalog Code W3410

Pellin Broca prism is a dispersing Brewster prism and is designed to emit in the direction of perpendicular to the incident beam. When the incident beam from a YAG laser is at Brewster angle it is possible to separate the second harmonic generation beam (532nm) and the fundamental harmonic generation beam (1064nm).

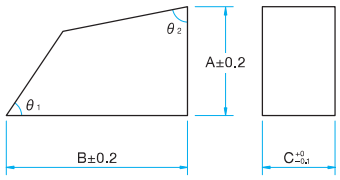
- The Pellin Broca prism is using Brewster angle and the critical angle to reduce reflection losses and obtain high transmittance.
- There is no coating on the surface of the Pellin Broca prism so it can be used with high energy pulsed laser.
- This prism is used at the (Brewster angle) angle of light intensity of the beam of light (invisible) of the YAG fundamental harmonic generation and second harmonic generation beam to minimize reflection by the prism incident surface.
- Make sure to use polarization direction of laser beam parallel to the bottom surface of the prism.
- It can also be used for multi-wavelength oscillation laser spectroscopy of an Argon laser.



Specifications

Material	Synthetic fused silica
Design wavelength	706nm (intermediate of 532nm and 1063nm)
Angle tolerance	<3′
Surface flatness of substrate	λ/10
Surface Quality (Scratch–Dig)	20–10
Clear aperture	Circle or ellipse inscribed in a rectangular of 90% of the dimension size

Outline Drawing (in mm)



Chamfer Ridge line about C0.3 (No chamfer obtuse angle)

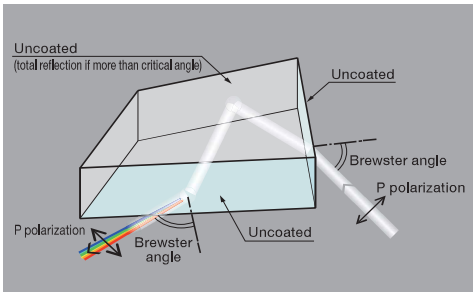
Guide

- We can provide Pellin broca prisms custom to the wavelength of your laser upon request.
- Other sizes are available, please contact our Sales Division with your request.

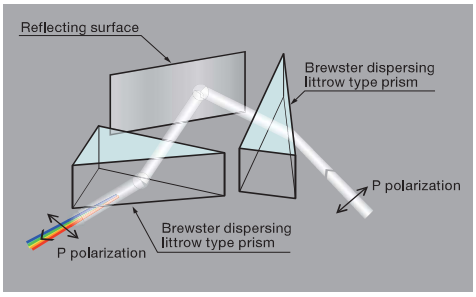
Attention

- Because it deviates from the Brewster angle, the beam emitted from the ultraviolet wavelength is not a non-reflective.
- Although it can also be used as a dispersing prism of non-polarized light, and not allowed to enter in the Brewster angle, it is not emitted at right angles to the incident angle.
- It can also be dispersed incident S polarized laser beam, reflection loss occurs in the incident surface and the exit surface.
- Fingerprints and dirt adhering to the uncoated surface will effect of the total reflection. Please use without touching anything on the uncoated surface.
- A and B dimension is slightly shorter than the actual catalog because it contains chamfer dimension. Dimensional tolerances are defined at the intersection of each side that does not include a chamfer.

Schematic



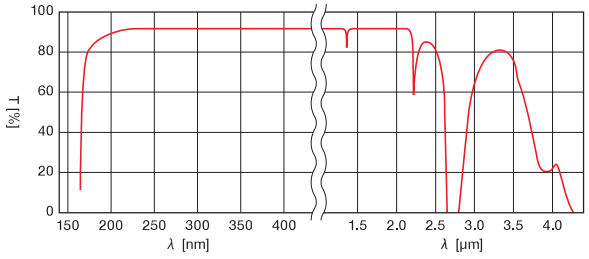
Equivalent optical system



Angular dispersion of YAG Laser

Brewster wavelength		1064nm	532nm
Incident angle (Brewster angle) [°]		55.39	55.61
Output angle [°]	1064nm	54.93	54.71
	532nm	56.30	56.08
	355nm	58.09	57.86
	266nm	61.01	60.76

Typical Transmittance Data T: Transmission



Specifications

Part Number	A [mm]	B [mm]	C [mm]	θ1 [°]	θ2 [°]
PBPQ-30L20-10	30	50	20	56.13	79.50

Light Pipe is an optical element for the illumination of uniform brightness distribution from a light having a non-uniform brightness distribution. It is used for the illumination optical system for image processing, and for converting the Gaussian profile to a top-hat profile.

- It uses a hexagonal prism with higher uniform efficiency than a rectangular prism.
- We offer a compact 30mm and higher homogeneity 75mm products.
- There are two materials BK7 for the visible to near-infrared region and synthetic fused silica for ultraviolet light.
- Distance of opposite sides are available in two types of 5mm and 10mm.

Specifications

Material	BK7, Synthetic fused silica
Angle tolerance	120°±5′
Parallelism	5′
Coating	Uncoated (Including the sides)
Recommended incident numerical aperture (NA)	>0.5
Surface Quality (Scratch–Dig)	60–40

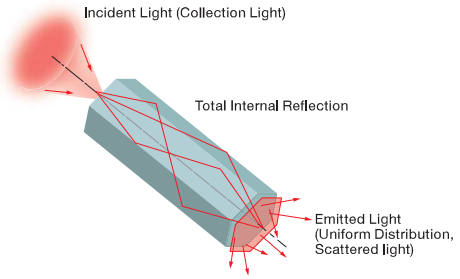
Guide

- Dedicated adapter (LPH-ADP) is available to mount the light pipe to the lens holder and the mirror holder.

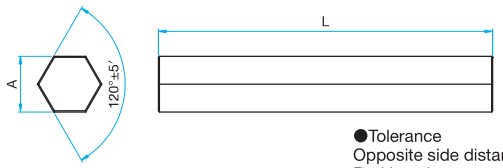
Attention

- Since it is totally reflected at the side, reflectance may get worse if fingerprints and dirt are on the side surfaces and may also cause an unevenness in the brightness distribution of the emitted light.
- It can not be used in collimated light. Please use large incident light of collection angle (divergence angle)
- Anti-reflection coating is not on both end faces and will have reflection (4%) of both end faces and transmittance loss of 7-8%.

Schematic



Outline Drawing (in mm)



●Tolerance
Opposite side distance A±0.1
Rod length L±0.3

Specifications

Part Number	Material	Opposite side distance A [mm]	Rod length L [mm]	surface flatness of polished surface
LPB-05L30	BK7	5	30	λ
LPB-10L75	BK7	10	75	3λ
LPSQ-05L30	Synthetic fused silica	5	30	λ
LPSQ-10L75	Synthetic fused silica	10	75	3λ

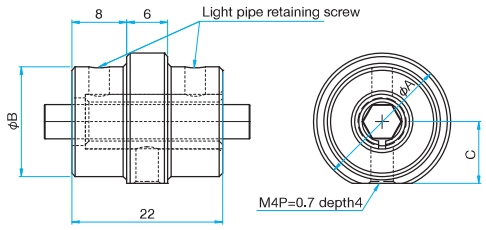
Light Pipe Adapter | LPH-ADP

Catalog Code W3217

This is the adapter for mounting the light pipe (LPB / LPSQ) and attaching to the mirror holder and lens holder.

- It can mount the light pipe without contacting the polished surface of the light pipe.
- Because of the resin attached, scratches can not occur to the light pipe.

Outline Drawing (in mm)



Specifications

Part Number	Compatible optics
LPH-ADP-05	LPB-05L30, LPSQ-05L30
LPH-ADP-10	LPB-10L75, LPSQ-10L75

Part Number	ϕA [mm]	ϕB [mm]	C [mm]
LPH-ADP-05	ϕ20	ϕ16	9
LPH-ADP-10	ϕ30	ϕ20	14

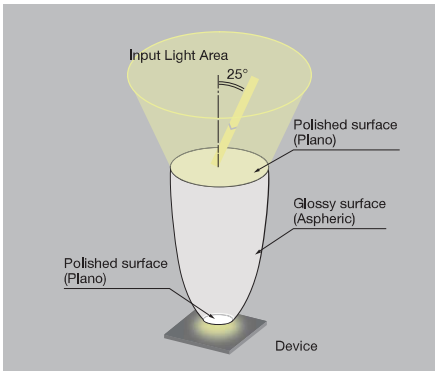
Parabolic Lens of Internal Reflection | CPC

RoHS Catalog Code W3213

Parabolic lens of internal reflection type is an optical element that, with incident lights from various directions reflected at the streamlined side surface, can collect the lights on the emitting end surface. It is used as a collector of solar cells.

- With the parallel light of 25° or less as an incident angle it is possible to collect efficiently the light at the emitting end surface even though the incident from any directions occurs.
- Since it is uses the internal reflection of the glass, the configuration is simplified compared with a lens system.
- By using the press molding technique of the glass lens, it achieves both high performance and low cost.

Schematic



Specifications

Part Number	CPC-14.24C29.02-P

Specifications

Material	B270® equivalent
Coating	Uncoated
Allowable acceptance angle	25°
Surface Quality (Scratch–Dig)	Both end surfaces: 80-50 Side surface (non-spherical): 160-50

* B270® is a registered trademark of SCHOTT AG.

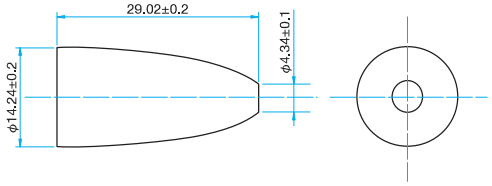
Guide

- It is available with anti-reflection coating on both end surfaces upon request.
- Other sizes in addition to products listed on the website and in our catalog are available, please contact our Sales Division with your request.

Attention

- Since it is totally reflected at the side (non-spherical), reflectance may be significantly worse if fingerprints and dirt are on that surface.
- The transmittance of the side is 99% or more, but since anti-reflection coating is not applied in the incident surface and emitting surface, the reflection loss of about 4% occurs.
- Light emitted from the end surface diverges largely and randomly without condensing to one point. Therefore, it should not be used for focused beam and collimated beam applications.

Outline Drawing (in mm)



Formula for Aspheric

$$Z(x)=1+\frac{Cx^2}{\sqrt{1-(1+K)C^2x^2}}+a^2x^2+a^4x^4+a^6x^6+a^8x^8+a^{10}x^{10}+a^{12}x^{12}$$

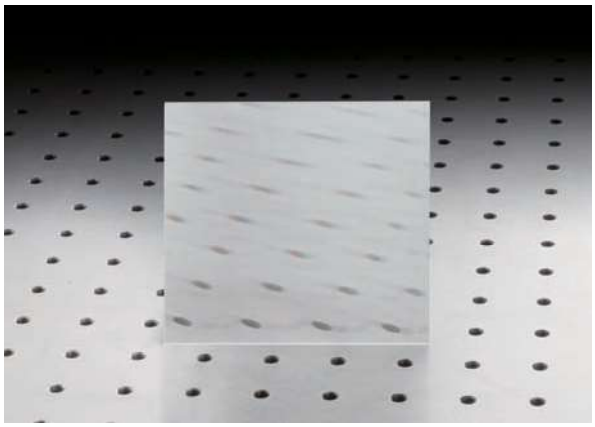
Coefficient	Numerical value
C	–0.00661615
K	21.98945555
a^2	6.634803136×10^{-4}
a^4	$-3.044342187\times10^{-6}$
a^6	6.004115152×10^{-9}
a^8	$-1.208582175\times10^{-11}$
a^{10}	$1.189971496\times10^{-14}$
a^{12}	$-5.290757204\times10^{-18}$

Prism Sheet | PRS

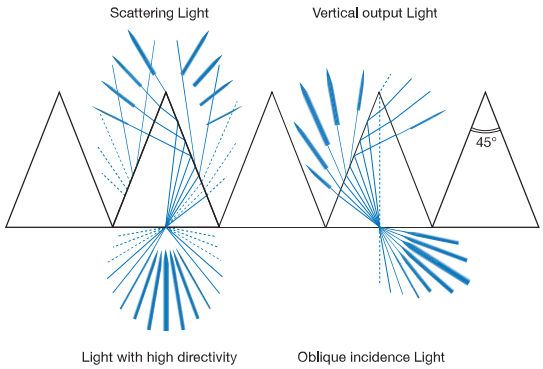
RoHS Catalog Code W3214

The Prism Sheet is used when changing the incident direction or diffusing a light source that is directional such as an optical device for the LCD TV or the display of the mobile terminal.

- Since the prism is processed directly to an acrylic plate of 2mm thickness, the performance is stable and not easily deformed.
- There are two types of pitch, 0.03mm and 0.05mm of the prism line.
- It can also be used as a Fresnel prism (prism plane).



Schematic



Specifications

Material	CLAREX
Refractive Index	1.49
Tip Angle	45°

* CLAREX is a registered trademark of Nitto Jushi Kogyo Co., Ltd.

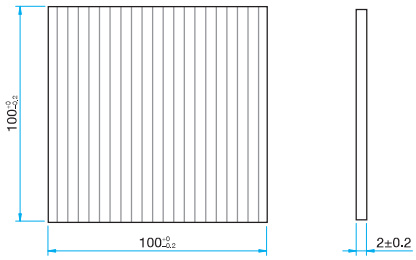
Guide

- The prism sheet is available at angles other than 45 °.
- We also offer the production of prism sheets for other sizes on demand.
- The prism surface looks jagged when observing the reflected light. (Reflection that does not look jagged is a actual surface)

Attention

- There is a directional nature in the prism sheet. If it is desired to diffuse the light in two dimensions, please use two prism sheets crossed.
- There is a wavelength dispersion in the prism sheet. When using a small width light source such as a fluorescent lamp a chromatic dispersion (Rainbow) occurs.
- Strongly rubbing the processed surface of the prism may cause degradation of the performance. Please do not directly touch the processed surface.
- It can be deformed when exposed to high temperature of 80 degrees or more and the performance can be severely affected.
- Do not use organic solvents such as acetone and chloroform. Prism structure will be broken by dissolving.
- Product is delivered with a protection sheet affixed to the surface, please use peel it off before use.

Outline Drawing (in mm)



Specifications

Part Number	Prism pitch [mm]
PRS-100S02-0.05	0.05
PRS-100S02-0.03	0.03

Contact sheet

Catalog Code W3813

It is also available for custom fabrication of a prism of which size is different in the catalog.
Simply fill in the inquiry sheet specifications, and please send us a fax or by e-mail.
We will contact you by return and confirm the specification.

Contact sheet for Special Order for Prism ☐Estimation ☐Order

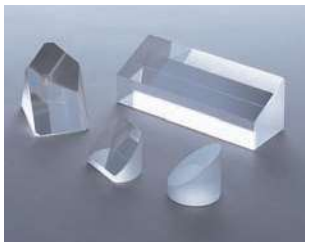
Date

☐ **To: Sigma Koki Co., Ltd.** **FAX +81-3-5638-6550**

Affiliation (Organization Name)						
Department			Name			
TEL		FAX		E-mail		
Country/Adress						
Name & Designation					(Tentative name is okay)	
Drawing Number			Estimate	☐ Yes: by Date		☐ No
Desired Delivery Date			Budget			JP Yen
Specifications of Prism	Quantity					
	Selected from standard product	Products Number			If you are using a prism of standard product, please fill in the product number.	
	Custom made	Name of the prism				
		Material	☐ BK7 ☐ Synthetic fused silica ☐ Other ( )			
		Surface flatness of substrate		Angle accuracy	☐ Standard (±3′) ☐ Other ( )	
Specifications of Coating	Presence or absence of coating		☐ No coating ☐ Single-layer AR coating ☐ Multi-layer AR coating ☐ Al only			
			☐ Al+MgF_2 ☐ Dielectric coating ☐ Other ( )			
Specifications of Light Source Used	Wavelength Range	λ = nm		Type		
	Output or Energy	W		Beam size	mm	
		J	Pulse width s		Repetition frequency Hz	
	Inicident angle	θ = °				
Shape, other	* Write more detailed specifications here. (Rough illustration is acceptable.)					

Sigma Koki Co., Ltd.

General Catalog 02



In addition to the catalog product, it can also be produced the special specifications such as the following.

[Examples of custom prism]