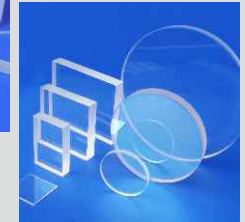
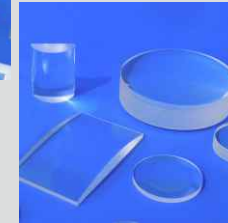


## Products Catalog



CeNing Optics Co Ltd  
3F, Building 2C  
XingYe West Road 12  
Fuzhou 350015, Fujian  
CHINA

Tel: +86-591-8733 8232  
E-mail: [sales@cn-optics.com](mailto:sales@cn-optics.com)  
Web: [www.cn-optics.com](http://www.cn-optics.com)



CeNing Optics

策 宁 光 学

[www.cn-optics.com](http://www.cn-optics.com)

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## CeNing Optics Co Ltd (Fuzhou - Suzhou)



CeNing Optics Co Ltd was founded in 2004 in Fuzhou, CHINA. CeNing is committed to manufacturing high quality optics for customers all over the world.

Started from a small workshop, CeNing has become a medium-size optics professional manufacturer. We employ approximately 35 staff, including six experienced engineers. Total company area is about 2000 square meters. We have built completely production lines from cutting grinding polishing to coating in house. In 2015 CeNing acquired a factory in Suzhou, now CeNing Optics is operating in two locations. The plant in Fuzhou manufactures flat optics and coating, the plant in Suzhou manufactures spherical and cylindrical optics.

CeNing mainly manufactures customized design optics from prototype to volume production. With thousands of existing tools and advance techniques and equipments, our experienced engineers and workers have capability to produce challenging optics in short time.

We always put 'Quality Guaranteed' in top priority. We employ a wide variety of metrology techniques and equipments like interferometers, high precision angular measurement, and lenses test system. We implement ISO 9001 for quality management and routinely test to applicable customer quality specifications.

### CeNing Optics (Fuzhou)

3F, Building 2C  
Xingye West Road 12  
Fuzhou, Fujian 350015  
CHINA

### CeNing Optics (Suzhou)

3F, Building 5  
Zouma Tang Road 29  
Suzhou, JiangSu, 215101  
CHINA



### Contact us

Tel: +86 591 8733 8232  
E-mail: sales@cn-optics.com  
Web: www.cn-optics.com

## Manufacturing Capability



CeNing offers manufacturing services to customers that require custom or OEM optics and components. We work with customers, on single one-of-a-kind parts, high volume orders and anything in between. CeNing employs the latest techniques and modern equipment to minimize waste and optimize delivery times. These savings are passed on to the customer by providing the highest quality products at the most economical pricing.



### Wide Range of Materials

- ▶ Specialty optical glass from CDGM, Ohara, Schott, Corning and HOYA.
- ▶ UV grade Fused Silica
- ▶ Sapphire, CaF<sub>2</sub>, MgF<sub>2</sub>, Quartz, Silicon.
- ▶ Laser crystals, nonlinear crystals.



### Manufacturing Accuracy

- ▶ Size range from 0.5mm to 300mm
- ▶ Dimensional tolerance:  $\pm 0.01$ mm
- ▶ Thickness tolerance:  $\pm 0.01$ mm
- ▶ Flatness  $\lambda/20$  (PV)
- ▶ Angular accuracy: 2 arcsec



### Coating Capability

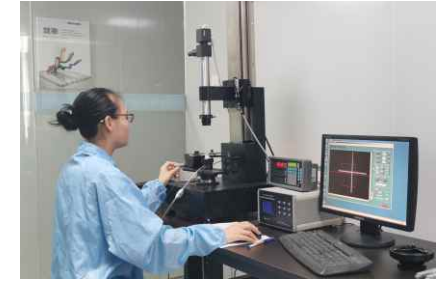
- ▶ Antireflective coating
- ▶ Metallic reflecting coating (Silver, Aluminum, Glod)
- ▶ Beam splitting coating
- ▶ High reflective dielectric coating
- ▶ Filter coating

## Quality Control

### Quality Guaranteed is always on top priority

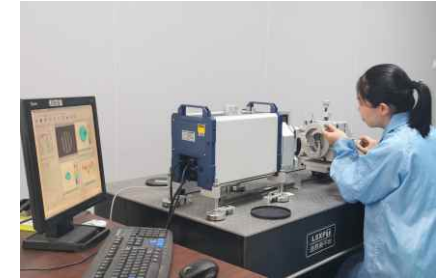
#### Lenses/Cylindrical lens Test Measurement

- ▶ Radius
- ▶ Focal length
- ▶ Centration



#### Interferometer

- ▶ Flatness (PV)
- ▶ Irregularity
- ▶ Wavefront distortion
- ▶ Radius
- ▶ Parallelism



#### Angular Measurement

- ▶ Parallelism
- ▶ Angle
- ▶ Beamsplitting angle
- ▶ Beam deviation



#### Visual Checking

- ▶ Dimensions
- ▶ Surface quality

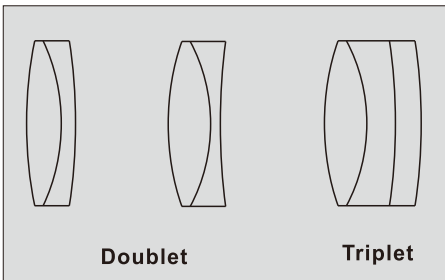
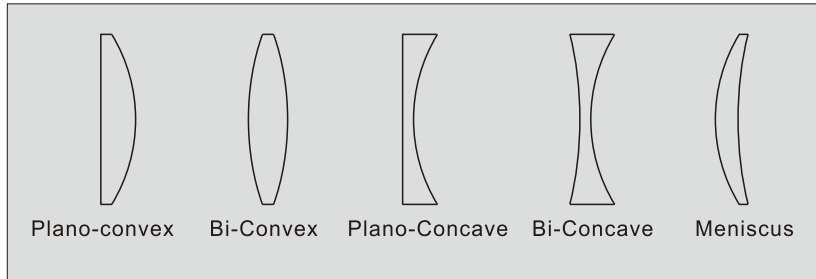


# Spherical Lenses

## Custom lenses capability

Available Materials: Optical glass from Schott, CDGM, Ohara, HOYA.  
UV Fused silica, Sapphire, CaF2,

Available Diameter: From Ø2.0mm to Ø300mm  
Central Thickness: From 0.5mm to 50mm



### Manufacturing specifications of lenses:

Diameter tolerance:	+0/-0.1mm for typical precision +0/-0.05mm for high precision
Central thickness tolerance:	±0.1mm for typical precision ±0.05mm for high precision
Flatness (Irregularity):	λ/4 for typical precision λ/8 for high precision
Radius tolerance (fringes):	N<3 fringe for typical precision N<1 fringe for high precision
Centration	3 arcmin for typical precision 1 arcmin for high precision

Custom Design

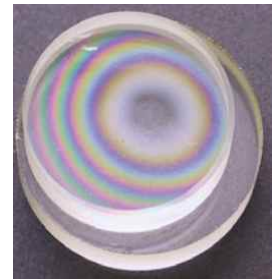
Price On request

### Radius tolerance

Radius tolerance of lenses can be defined with newton fringes (N) formed between the test curved surface and a reference surface with a highly calibrated radius. The more of fringes present, the larger radius difference between test face and reference face. Typically N<3 fringes, and 1 fringe for high precision application.

The relationship between newton fringe (N) and radius tolerance (ΔR) can be calculated from the equation  $N=(D^2*\Delta R)/4\lambda$ , where D is diameter.

Radius tolerance can be also specified with value directly. For example  $R=100\pm 0.5mm$



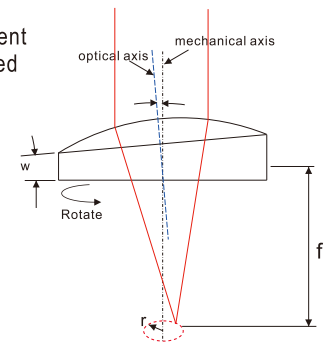
### Centration

Centration, also known as decenter, is the physical displacement of the mechanical axis from optical axis. Centration is measured and calculated with the equation:

$$W=r/f(n-1)$$

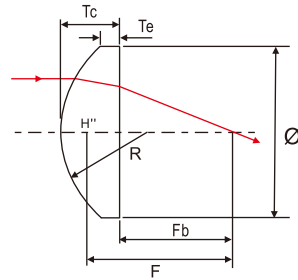
where W is wedge angle, often reported as arc minute  
r is the radius of trace-circle of focal point when the lens is rotated.

n is index of refraction  
f is focal length



### Plano-Convex Lenses

Diameter tolerance: ±0.1mm  
 Thickness tolerance: ±0.1mm  
 Focal length tolerance: ±1%  
 Design wavelength: 546nm  
 Surface quality: 60-40 S/D  
 Flatness: λ/4 @633nm  
 Centration: 3 arcmin  
 Clear aperture: 90%

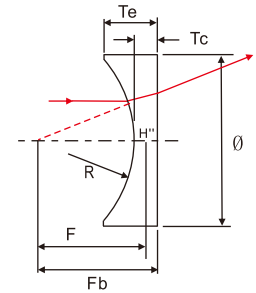


Item#	Diameter	Focal	Material	R	Tc	Te	Fb
LP01-12.7-15	Ø12.7	15.0	N-BK7	7.75	5.10	1.8	11.63
LP01-12.7-20	Ø12.7	20.0	N-BK7	10.34	3.98	1.8	17.38
LP01-12.7-25	Ø12.7	25.0	N-BK7	12.92	3.47	1.8	22.71
LP01-12.7-30	Ø12.7	30.0	N-BK7	15.50	3.16	1.8	27.91
LP01-12.7-40	Ø12.7	40.0	N-BK7	20.67	2.80	1.8	38.15
LP01-12.7-50	Ø12.7	50.0	N-BK7	25.84	2.60	1.8	48.29
LP01-12.7-75	Ø12.7	75.0	N-BK7	38.76	2.33	1.8	73.46
LP01-12.7-85	Ø12.7	85.0	N-BK7	43.93	2.26	1.8	83.51
LP01-12.7-100	Ø12.7	100.0	N-BK7	51.7	2.19	1.8	98.60
LP01-25.4-35	Ø25.4	35.0	N-BK7	18.09	7.20	2.0	30.26
LP01-25.4-40	Ø25.4	40.0	N-BK7	20.67	6.36	2.0	35.80
LP01-25.4-50	Ø25.4	50.0	N-BK7	25.84	5.34	2.0	46.48
LP01-25.4-60	Ø25.4	60.0	N-BK7	31.00	4.72	2.0	56.87
LP01-25.4-75	Ø25.4	75.0	N-BK7	38.76	4.14	2.0	72.27
LP01-25.4-100	Ø25.4	100.0	N-BK7	51.7	3.58	2.0	97.67
LP01-25.4-125	Ø25.4	125.0	N-BK7	64.6	3.26	2.0	122.85
LP01-25.4-150	Ø25.4	150.0	N-BK7	77.52	3.05	2.0	147.99
LP01-25.4-200	Ø25.4	200.0	N-BK7	103.36	2.78	2.0	198.17
LP01-25.4-250	Ø25.4	250.0	N-BK7	129.2	2.63	2.0	248.26
LP01-25.4-300	Ø25.4	300.0	N-BK7	155.04	2.52	2.0	298.34
LP01-25.4-400	Ø25.4	400.0	N-BK7	206.7	2.40	2.0	398.38
LP01-25.4-500	Ø25.4	500.0	N-BK7	258.4	2.32	2.0	498.47
LP01-25.4-750	Ø25.4	750.0	N-BK7	387.6	2.20	2.0	748.55
LP01-25.4-1000	Ø25.4	1000.0	N-BK7	516.8	2.15	2.0	998.38
LP01-50.8-100	Ø50.8	100	N-BK7	51.7	9.67	3.0	93.66
LP01-50.8-125	Ø50.8	125	N-BK7	64.6	8.20	3.0	119.59
LP01-50.8-150	Ø50.8	150	N-BK7	77.52	7.28	3.0	145.20
LP01-50.8-200	Ø50.8	200	N-BK7	103.36	6.17	3.0	195.93
LP01-50.8-250	Ø50.8	250	N-BK7	129.2	5.53	3.0	246.35
LP01-50.8-300	Ø50.8	300	N-BK7	155.04	5.10	3.0	296.64
LP01-50.8-400	Ø50.8	400	N-BK7	206.7	4.56	3.0	396.96
LP01-50.8-500	Ø50.8	500	N-BK7	258.4	4.25	3.0	497.19
LP01-50.8-750	Ø50.8	750	N-BK7	387.6	3.83	3.0	747.47
LP01-50.8-1000	Ø50.8	1000	N-BK7	516.8	3.62	3.0	997.61

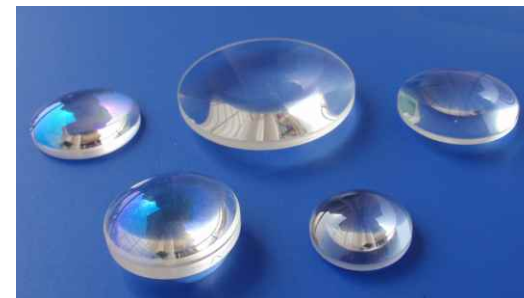
Note: The listed lenses are without coating, please contact us for coating.

### Plano-Concave Lenses

Diameter tolerance: ±0.1mm  
 Thickness tolerance: ±0.1mm  
 Focal length tolerance: ±1%  
 Design wavelength: 546nm  
 Surface quality: 60-40 S/D  
 Flatness: λ/4 @633nm  
 Centration: 3 arcmin  
 Clear aperture: 90%



Item#	Diameter	Focal	Material	R	Tc	Te	Fb
LP13-6-6	Ø6.0	-6.0	N-SF11	-4.71	1.5	2.22	-6.8
LP13-6-9	Ø6.0	-9.0	N-SF11	-7.06	1.5	2.04	-9.84
LP11-6-12	Ø6.0	-12.0	N-BK7	-6.20	1.5	2.12	-12.99
LP11-6-15	Ø6.0	-15.0	N-BK7	-7.75	2.0	2.49	-16.32
LP11-6-18	Ø6.0	-18.0	N-BK7	-9.30	2.0	2.40	-19.32
LP13-12.7-12	Ø12.7	-12.0	N-SF11	-9.42	2.0	4.46	-13.13
LP13-12.7-15	Ø12.7	-15.0	N-SF11	-11.77	2.0	3.86	-16.12
LP13-12.7-18	Ø12.7	-18.0	N-SF11	-14.12	2.0	3.50	-19.12
LP11-12.7-25	Ø12.7	-25.0	N-BK7	-12.92	2.0	3.67	-26.3
LP11-12.7-30	Ø12.7	-30.0	N-BK7	-15.50	2.0	3.36	-31.3
LP11-12.7-40	Ø12.7	-40.0	N-BK7	-20.67	2.0	3.00	-41.3
LP11-12.7-50	Ø12.7	-50.0	N-BK7	-25.84	2.0	2.79	-51.3
LP13-25.4-30	Ø25.4	-30.0	N-SF11	-23.54	3.5	7.2	-31.96
LP11-25.4-50	Ø25.4	-50.0	N-BK7	-25.84	3.5	6.8	-52.32
LP11-25.4-75	Ø25.4	-75.0	N-BK7	-38.76	3.5	5.6	-77.32
LP11-25.4-100	Ø25.4	-100.0	N-BK7	-51.7	3.5	5.0	-102.36
LP11-25.4-150	Ø25.4	-150.0	N-BK7	-77.52	3.5	4.5	-152.3
LP11-25.4-200	Ø25.4	-200.0	N-BK7	-103.36	3.5	4.3	-202.3
LP11-50.8-100	Ø50.8	-75.0	N-BK7	-38.76	3.5	13.0	-77.3
LP11-50.8-150	Ø50.8	-100.0	N-BK7	-51.7	4.0	10.6	-102.69
LP11-50.8-200	Ø50.8	-150.0	N-BK7	-77.52	4.0	8.2	-152.67

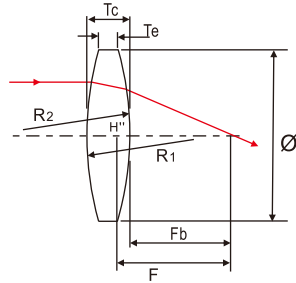


Custom Design

Price On request

### Double-Convex Lenses

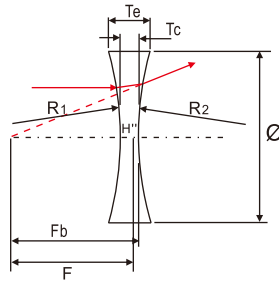
Diameter tolerance: ±0.1mm  
 Thickness tolerance: ±0.1mm  
 Focal length tolerance: ±1%  
 Design wavelength: 546nm  
 Surface quality: 60-40 S/D  
 Flatness: λ/4 @633nm  
 Centration: 3 arcmin  
 Clear aperture: 90%



Item#	Diameter	Focal	Material	R1=-R2	Tc	Te	Fb
LB01-12.7-20	Ø12.7	20.0	N-BK7	20.00	3.85	1.80	18.69
LB01-12.7-30	Ø12.7	30.0	N-BK7	30.46	3.14	1.80	28.94
LB01-12.7-50	Ø12.7	50.0	N-BK7	51.25	2.60	1.80	49.15
LB01-12.7-75	Ø12.7	75.0	N-BK7	77.12	2.33	1.80	74.22
LB01-12.7-100	Ø12.7	100.0	N-BK7	103.0	2.20	1.80	99.29
LB01-25.4-30	Ø25.4	30.0	N-BK7	29.64	7.72	2.00	27.34
LB01-25.4-50	Ø25.4	50.0	N-BK7	50.77	5.23	2.00	48.24
LB01-25.4-75	Ø25.4	75.0	N-BK7	76.81	4.12	2.00	73.63
LB01-25.4-100	Ø25.4	100.0	N-BK7	102.74	3.58	2.00	98.81
LB01-25.4-150	Ø25.4	150.0	N-BK7	154.52	3.05	2.00	148.99
LB01-25.4-200	Ø25.4	200.0	N-BK7	206.30	2.78	2.00	199.13

Note: The listed lenses are without coating, please contact us for coating.

### Double-Concave Lenses



Item#	Diameter	Focal	Material	R1=-R2	Tc	Te	Fb
LB11-12.7-15	Ø12.7	-15.0	N-BK7	-15.84	2.0	4.6	-15.65
LB11-12.7-25	Ø12.7	-25.0	N-BK7	-26.17	2.0	3.5	-25.64
LB11-12.7-50	Ø12.7	-50.0	N-BK7	-52.1	2.0	2.7	-50.7
LB11-25.4-50	Ø25.4	-50.0	N-BK7	-52.10	2.5	5.6	-50.82
LB11-25.4-75	Ø25.4	-75.0	N-BK7	-78.0	2.5	4.5	-75.87
LB11-25.4-100	Ø25.4	-100.0	N-BK7	-104.0	3.0	4.5	-101.

Custom Design

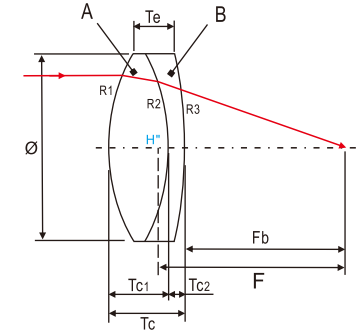
Price On request

### Achromatic Lenses

Achromatic lenses are lenses consisting of two or more elements, which are usually made of crown and flint glass with differing indices of refraction. One element is positive, the other is negative. Distinct wavelengths can be corrected for chromatic aberration.

Achromatic lenses are nearly free from aspherical aberration and coma. Comparing with singlet lenses, achromatic lenses have far superior optical performance.

Diameter tolerance: ±0.1mm  
 Designed wavelength: 430-680nm  
 Focal length tolerance: ±2%  
 Surface quality: 60-40 S/D  
 Centration: <3 arcmin  
 Surface flatness: λ/4 @633nm  
 Clear aperture: 90%  
 Bevel: protective bevel  
 Coating: AR @430-680nm, R<0.5%



Item#	Diameter	Focal	Fb	Tc1+Tc2	Te	A	B	R1	R2	R3
LAO-3-4.5	Ø3.0	4.5	2.99	2.00+1.00	2.48	N-LAK22	N-SF6	3.16	2.23	7.88
LAO-3-6	Ø3.0	6.0	4.33	1.97+1.03	2.67	N-BaF10	N-SF10	4.13	2.36	21.7
LAO-3-9	Ø3.0	9.0	7.79	1.47+1.03	2.19	N-BK7	N-SF5	5.26	3.98	12.05
LAO-3-12	Ø3.0	12.0	10.77	1.68+1.00	2.45	N-BK7	N-SF5	7.39	5.15	14.62
LAO-4-6	Ø4.0	6.0	3.92	2.80+1.00	3.19	N-BaF10	N-SF10	4.24	2.6	18.9
LAO-4-8	Ø4.0	8.0	6.69	1.50+1.03	2.09	N-BaF10	N-SF10	5.76	3.49	26.05
LAO-4-10	Ø4.0	10.0	8.40	2.00+1.00	2.65	N-BaF10	N-SF10	7.12	4.22	33.66
LAO-4-12	Ø4.0	12.0	10.70	1.80+1.00	2.39	N-BK7	N-SF5	7.35	5.09	14.6
LAO-5-10	Ø5.0	10.0	8.56	1.73+1.03	2.22	N-BaF10	N-SF10	7.17	4.39	33.96
LAO-5-15	Ø5.0	15.0	13.64	1.55+1.03	2.23	N-BaF10	N-SF10	10.67	6.46	53.57
LAO-5-20	Ø5.0	20.0	18.60	1.61+1.03	2.37	N-BaF10	N-SF10	14.11	8.63	75.59
LAO-6-10	Ø6.0	10.0	7.83	3.06+1.03	3.52	N-BaF10	N-SF10	6.98	4.35	41.01
LAO-6-12.5	Ø6.0	12.5	10.36	3.00+0.08	3.35	N-BaF10	N-SF10	8.63	5.29	51.17
LAO-6-15	Ø6.0	15.0	13.0	2.50+1.50	3.20	N-BK7	N-SF2	8.79	6.55	21.68
LAO-6-20	Ø6.0	20.0	18.23	2.70+0.9	3.05	N-BK7	N-SF2	12.3	8.71	24.98
LAO-6-25	Ø6.0	25.0	23.45	2.30+0.9	2.76	N-BK7	N-SF2	15.37	11.16	32.17
LAO-6-30	Ø6.0	30.0	28.43	2.30+0.9	2.83	N-BK7	N-SF2	18.11	13.51	39.29
LAO-6-35	Ø6.0	35.0	33.59	2.30+0.9	2.89	N-BK7	N-SF2	23.14	14.51	38.86
LAO-6-40	Ø6.0	40.0	38.46	2.30+1.0	3.03	N-BK7	N-SF2	25.05	17.27	49.33
LAO-6-50	Ø6.0	50.0	48.61	2.00+1.0	2.78	N-BK7	N-SF2	30.77	22.05	64.60

Custom Design

Price On request



Custom Design Price On request

Design wavelength: 430-680nm

Item#	Diameter	Focal	Fb	Tc1+Tc2	Te	A	B	R1	R2	R3
LAO-10-15	Ø10.0	15.0	10.66	5.50+2.0	6.00	N-BaF10	N-SF10	10.04	7.0	80.71
LAO-10-20	Ø10.0	20.0	17.25	4.00+1.0	3.91	N-BaF10	N-SF10	14.15	8.38	71.22
LAO-10-25	Ø10.0	25.0	22.60	3.50+1.5	3.76	N-BK7	N-SF5	15.37	11.10	31.47
LAO-10-30	Ø10.0	30.0	27.47	3.50+2.0	4.48	N-BK7	N-SF5	18.58	13.17	37.11
LAO-10-40	Ø10.0	40.0	37.79	3.00+1.5	3.75	N-BK7	N-SF5	23.66	18.11	55.78
LAO-10-50	Ø10.0	50.0	47.45	3.00+1.5	3.89	N-BK7	N-SF5	26.22	23.95	97.55
LAO-10-100	Ø10.0	100.0	98.16	3.00+1.5	3.70	N-BK7	N-SF5	60.99	43.74	130.98
LAO-12.7-15	Ø12.7	15.0	10.82	6.00+1.0	4.17	N-LAK22	N-SF6	9.55	8.6	48.5
LAO-12.7-25	Ø12.7	25.0	21.47	5.00+1.25	4.85	N-BaF10	N-SF10	17.27	10.99	107.03
LAO-12.7-30	Ø12.7	30.0	27.5	3.50+1.50	3.4	N-BK7	N-SF2	17.86	13.53	44.17
LAO-12.7-35	Ø12.7	35.0	32.50	3.68+1.50	3.94	N-SK11	N-SF5	22.94	15.54	58.84
LAO-12.7-40	Ø12.7	40.0	37.54	3.73+1.33	3.84	N-BK7	N-SF5	24.77	18.01	51.17
LAO-12.7-50	Ø12.7	50.0	47.61	3.50+1.50	4.02	N-BK7	N-SF5	30.73	22.32	64.75
LAO-12.7-60	Ø12.7	60.0	57.59	3.50+1.50	4.18	N-BK7	N-SF5	36.51	26.33	78.35
LAO-12.7-75	Ø12.7	75.0	72.35	3.00+1.60	3.95	N-BK7	N-SF5	46.44	33.77	95.94
LAO-12.7-80	Ø12.7	80.0	78.40	2.10+1.60	3.09	N-BK7	N-SF5	49.62	35.73	103.22
LAO-12.7-90	Ø12.7	90.0	88.47	1.98+1.60	3.04	N-BK7	N-SF5	55.80	10.17	116.32
LAO-12.7-100	Ø12.7	100.0	97.92	3.00+1.50	4.00	N-BK7	N-SF5	61.54	44.39	130.26
LAO-12.7-125	Ø12.7	125.0	121.95	4.50+2.00	6.11	N-BK7	N-SF5	76.92	55.48	162.59
LAO-15-20	Ø15.0	20.0	15.34	6.80+2.0	5.98	N-BaF10	N-SF57	14.01	11.36	44.21
LAO-15-30	Ø15.0	30.0	25.78	6.50+1.5	5.88	N-BaF10	N-SF10	20.72	13.17	128.44
LAO-15-40	Ø15.0	40.0	35.63	5.98+1.6	6.38	N-BaF10	N-SF10	26.97	17.64	205.03
LAO-15-50	Ø15.0	50.0	46.17	5.00+1.5	5.12	N-BK7	N-SF5	26.81	23.82	90.79
LAO-15-60	Ø15.0	60.0	57.48	3.50+2.0	4.37	N-BK7	N-SF5	37.23	26.69	76.36
LAO-15-75	Ø15.0	75.0	70.78	5.00+2.5	6.59	N-BK7	N-SF5	39.61	36.46	145.02
LAO-18-30	Ø18.0	30.0	24.97	6.91+2.0	6.55	N-BaF10	N-SF10	20.73	14.31	133.58
LAO-18-35	Ø18.0	35.0	30.72	6.01+1.6	5.61	N-BaF10	N-SF10	24.26	16.23	152.99
LAO-18-40	Ø18.0	40.0	35.63	5.98+1.6	5.84	N-BaF10	N-SF10	26.97	17.64	205.03
LAO-18-60	Ø18.0	60.0	56.79	3.85+2.0	4.71	N-BaF10	N-SF10	42.51	26.24	226.77
LAO-18-75	Ø18.0	75.0	72.15	3.27+2.0	4.36	N-BaF10	N-SF10	53.03	32.72	288.05

Design wavelength: 430-680nm

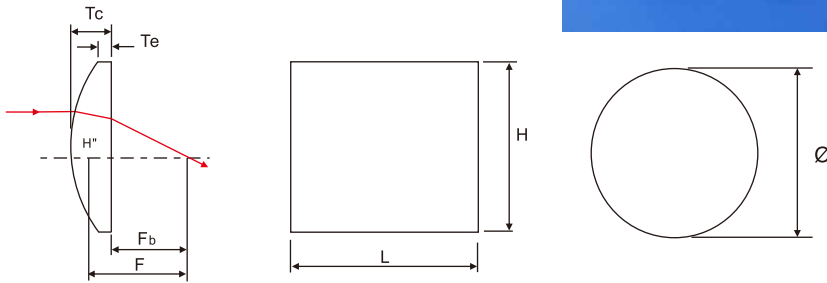
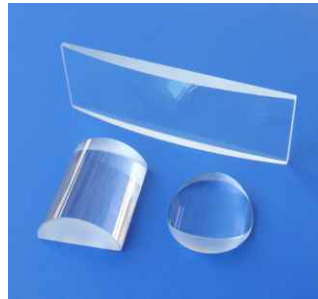
Item#	Diameter	Focal	Fb	Tc1+Tc2	Te	A	B	R1	R2	R3
LAO-25.4-30	Ø25.4	30.0	22.23	11.04+3.00	9.13	N-BaF10	N-SF10	21.17	16.08	118.66
LAO-25.4-40	Ø25.4	45.0	39.28	7.89+3.00	7.00	N-SK11	N-SF5	28.75	21.38	82.92
LAO-25.4-50	Ø25.4	50.0	43.53	9.00+2.50	8.70	N-BaF10	N-SF10	34.53	21.98	214.63
LAO-25.4-75	Ø25.4	75.0	70.39	7.00+2.50	6.88	N-BK7	N-SF5	46.44	33.77	95.94
LAO-25.4-85	Ø25.4	85.0	81.21	5.00+3.00	6.00	N-SK11	N-SF5	55.68	38.37	146.45
LAO-25.4-100	Ø25.4	100.0	95.92	6.00+2.50	6.55	N-BK7	N-SF5	61.47	44.64	129.94
LAO-25.4-125	Ø25.4	125.0	120.89	6.00+2.40	6.84	N-BK7	N-SF5	76.28	54.55	162.43
LAO-25.4-150	Ø25.4	150.0	146.10	5.70+2.20	6.60	N-BK7	N-SF5	91.37	66.21	197.71
LAO-25.4-175	Ø25.4	175.0	170.84	6.00+3.00	7.90	N-BK7	N-SF5	109.16	79.38	226.03
LAO-25.4-200	Ø25.4	200.0	194.14	8.50+4.00	11.53	N-BK7	N-SF5	124.12	87.26	253.10
LAO-25.4-225	Ø25.4	225.0	222.7	3.00+2.50	4.64	N-BK7	N-SF5	139.53	100.21	291.32
LAO-25.4-250	Ø25.4	250.0	246.63	5.00+2.50	6.72	N-BK7	N-SF5	160.73	105.64	295.75
LAO-25.4-275	Ø25.4	275.0	271.60	5.00+2.50	6.80	N-BK7	N-SF5	171.03	121.54	352.46
LAO-25.4-300	Ø25.4	300.0	297.73	3.00+2.50	4.58	N-BK7	N-SF5	184.84	134.06	393.98
LAO-25.4-400	Ø25.4	400.0	397.84	3.00+2.50	5.02	N-BK7	N-SF5	244.65	179.62	534.1
LAO-25.4-500	Ø25.4	500.0	497.57	3.00+2.50	5.13	N-BK7	N-SF5	290.71	232.07	750.52
LAO-25.4-750	Ø25.4	750.0	746.47	2.50+2.50	4.74	N-BK7	N-SF5	315.2	507.71	∞
LAO-30-50	Ø30.0	50.0	42.57	11.00+2.20	9.25	N-BaF10	N-SF10	34.81	22.12	203.48
LAO-30-60	Ø30.0	60.0	52.50	8.47+2.99	7.66	N-SSK8	N-SF10	32.6	31.81	799.64
LAO-30-75	Ø30.0	75.0	67.44	8.40+3.00	8.40	N-SSK8	N-SF10	40.51	38.68	922.04
LAO-30-100	Ø30.0	100.0	94.54	8.25+2.80	8.31	N-BK7	N-SF5	61.36	44.3	128.9
LAO-30-125	Ø30.0	125.0	121.37	4.92+2.50	5.52	N-SK11	N-SF5	81.53	56.59	220.08
LAO-30-150	Ø30.0	150.0	144.63	8.10+2.60	8.88	N-BK7	N-SF5	91.31	65.57	195.87
LAO-30-200	Ø30.0	200.0	196.57	5.00+2.50	6.15	N-BK7	N-SF5	123.77	89.22	259.43
LAO-30-300	Ø30.0	300.0	296.85	4.50+2.50	6.12	N-BK7	N-SF5	184.4	133.95	394.96
LAO-40-80	Ø40.0	80.0	70.75	12.07+4.00	11.75	N-BaF10	N-SF10	53.76	36.73	435.85
LAO-40-100	Ø40.0	100.0	91.24	10.00+3.00	7.92	N-BK7	N-SF5	46.73	50.61	341.7
LAO-40-200	Ø40.0	200.0	194.20	8.50+4.00	10.10	N-BK7	N-SF5	124.12	87.26	253.1
LAO-40-250	Ø40.0	250.0	244.32	8.00+4.50	10.57	N-BK7	N-SF5	156.0	108.7	313.64
LAO-40-300	Ø40.0	300.0	293.63	9.00+4.10	11.66	N-BAK4	N-SF10	194.96	148.27	483.71
LAO-50.8-100	Ø50.8	100.0	89.94	13.92+4.00	12.53	N-BaF10	N-SF10	69.28	46.95	446.01
LAO-50.8-150	Ø50.8	150.0	143.17	9.50+4.00	8.93	N-BAK4	N-SF10	96.85	73.74	241.63
LAO-50.8-200	Ø50.8	200.0	194.45	9.00+3.50	9.11	N-BAK4	N-SF10	130.48	99.36	320.2
LAO-50.8-250	Ø50.8	250.0	243.41	9.75+3.50	10.54	N-BAK4	N-SF10	162.59	123.82	402.58
LAO-50.8-300	Ø50.8	300.0	292.91	9.00+3.50	10.25	N-BAK4	N-SF10	173.11	164.03	709.83
LAO-50.8-350	Ø50.8	350.0	344.32	8.00+4.00	10.07	N-BAK4	N-SF10	227.16	174.83	571.49
LAO-50.8-500	Ø50.8	500.0	494.50	8.00+4.00	10.50	N-BK7	N-SF5	305.74	223.2	663.82

Custom Design Price On request

# Cylindrical Lenses

## Cylindrical Plano-Convex Lenses

Diameter tolerance:  $\pm 0.1\text{mm}$   
 Thickness tolerance:  $\pm 0.1\text{mm}$   
 Focal length tolerance:  $\pm 1\%$   
 Design wavelength: 546nm  
 Surface quality: 40-20 S/D  
 Flatness:  $\lambda/4 @ 633\text{nm}$   
 Centration: 3 arcmin  
 Clear aperture: 90%



Item#	Length x Height	Focal	Material	Fb	R	Tc	Te
LC01-12x10-10	12.0x10.0	10.0	N-BK7	6.17	5.2	5.9	2.0
LC01-12x10-12.7	12.0x10.0	12.7	N-BK7	9.93	6.6	4.3	2.0
LC01-12x10-15	12.0x10.0	15.0	N-BK7	12.18	7.8	3.8	2.0
LC01-12x10-20	12.0x10.0	20.0	N-BK7	17.75	10.3	3.3	2.0
LC01-12x10-25	12.0x10.0	25.0	N-BK7	22.98	12.9	3.0	2.0
LC01-40x20-25	40.0x20.0	25.0	N-BK7	20.51	12.9	6.8	2.0
LC01-40x20-30	40.0x20.0	30.0	N-BK7	26.26	15.5	5.7	2.0
LC01-40x20-40	40.0x20.0	40.0	N-BK7	36.98	20.7	4.6	2.0
LC01-40x20-50	40.0x20.0	50.0	N-BK7	47.28	25.8	4.0	2.0

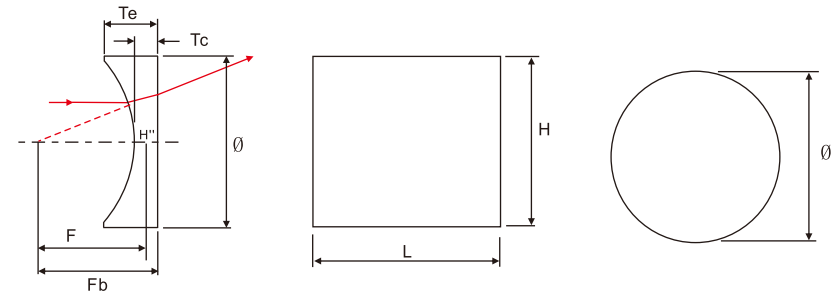
Item#	Diameter	Focal	Material	Fb	R	Tc	Te
LC01-12.7-15	Ø12.7	15.0	N-BK7	11.63	7.75	5.1	1.8
LC01-12.7-20	Ø12.7	20.0	N-BK7	17.37	10.34	4.0	1.8
LC01-12.7-25	Ø12.7	25.0	N-BK7	22.70	12.92	3.5	1.8
LC01-12.7-30	Ø12.7	30.0	N-BK7	27.91	15.5	3.2	1.8
LC01-12.7-50	Ø12.7	50.0	N-BK7	48.28	25.84	2.6	1.8
LC01-25.4-50	Ø25.4	50.0	N-BK7	46.47	25.84	5.3	2.0
LC01-25.4-75	Ø25.4	75.0	N-BK7	72.27	38.76	4.1	2.0
LC01-25.4-100	Ø25.4	100.0	N-BK7	97.66	51.7	3.6	2.0

Note: The listed lenses are without coating, please contact us for coating.

Custom Design

Price On request

## Cylindrical Plano-Concave Lenses - Rectangular



Item#	Length x Height	Focal	Material	Fb	R	Tc	Te
LC11-12x10-10	12.0x10.0	-10.0	N-BK7	-11.3	-5.17	2.0	5.8
LC11-12x10-12.7	12.0x10.0	-12.7	N-BK7	-14.0	-6.6	2.0	4.3
LC11-12x10-15	12.0x10.0	-15.0	N-BK7	-16.3	-7.75	2.0	3.8
LC11-12x10-20	12.0x10.0	-20.0	N-BK7	-21.3	-10.34	2.0	3.3
LC11-12x10-25	12.0x10.0	-25.0	N-BK7	-26.3	-12.92	2.0	3.0
LC11-40x20-25	40.0x20.0	-25.0	N-BK7	-26.3	-12.92	2.0	6.7
LC11-40x20-30	40.0x20.0	-30.0	N-BK7	-31.3	-15.5	2.0	5.6
LC11-40x20-40	40.0x20.0	-40.0	N-BK7	-41.4	-20.7	2.0	4.5
LC11-40x20-50	40.0x20.0	-50.0	N-BK7	-51.3	-25.8	2.0	4.0

Item#	Diameter	Focal	Material	Fb	R	Tc	Te
LC11-12.7-15	Ø12.7	-15.0	N-BK7	-16.2	-7.75	1.8	5.1
LC11-12.7-20	Ø12.7	-20.0	N-BK7	-21.2	-10.34	1.8	4.0
LC11-12.7-25	Ø12.7	-25.0	N-BK7	-26.2	-12.92	1.8	3.5
LC11-12.7-30	Ø12.7	-30.0	N-BK7	-31.2	-15.5	1.8	3.1
LC11-12.7-50	Ø12.7	-50.0	N-BK7	-51.3	-25.84	2.0	2.6
LC11-25.4-50	Ø25.4	-50.0	N-BK7	-51.3	-25.84	2.0	5.3
LC11-25.4-75	Ø25.4	-75.0	N-BK7	-76.3	-38.76	2.0	4.1
LC11-25.4-100	Ø25.4	-100.0	N-BK7	-101.3	-51.7	2.0	3.5



Custom Design

Price On request

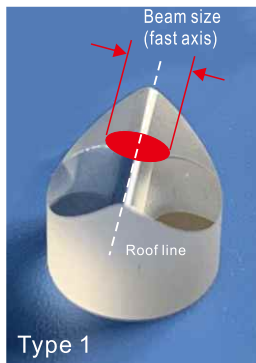
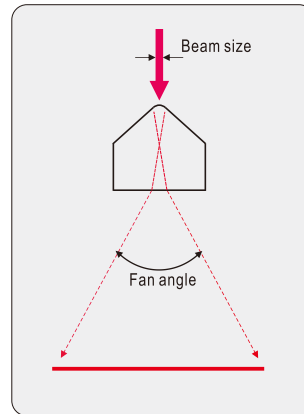
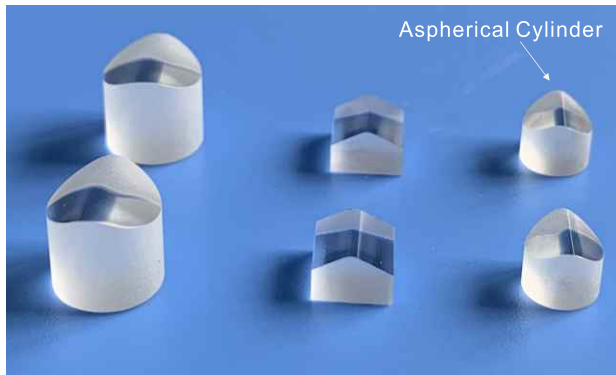


# Powell Lenses

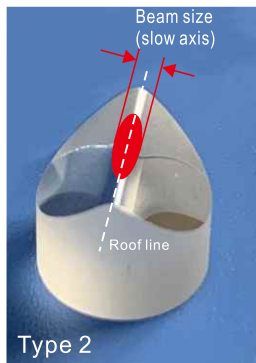
Powell lenses is used to generate straight line. With aspherical curvature on its apex, the output line from powell lenses is even distribution of energy. For comparison, Cylindrical lenses generate gaussian beam profiles with hot-spot centre points and fading edges.

To get even distribution of energy, the apex curvature need to be precisely modified and optimized for particular laser beam.

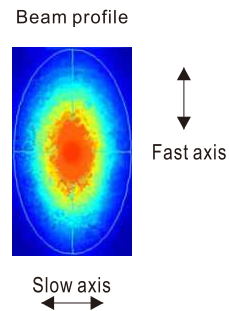
With unique manufacturing technology and measurement, CeNing can make powell lenses matched for diode lasers and fiber lasers, the available uniformity can be less than 10% and straightness less than 0.02%.



Fast axis spread



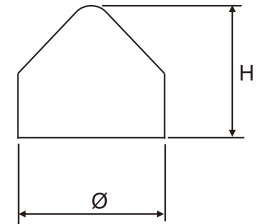
Slow axis spread



Material: N-BK7 or N-SF6L  
 Diameter tolerance: +0/-0.05mm  
 Height tolerance: ±0.5mm  
 Surface quality: 80-50 S/D  
 Flatness: L/4

Energy Uniformity: <30% @ specific beam size.  
 Line straightness: <0.05%  
 Symmetry: <0.05mm

Incident beam size: 0.3--6.0mm ( 1/e<sup>2</sup> Gaussian beam)  
 Wavelength: 400-1000nm  
 Fan angle range: 5°--110°  
 Fan angle tolerance: ±1°  
 Incidence direction: Fast axis spread, Slow axis spread



**Custom Design**  
**Price On request**

### 6.0mm lenses

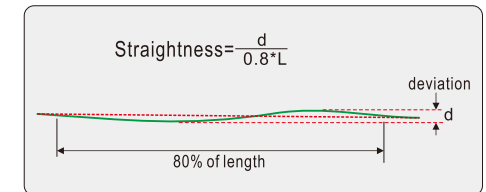
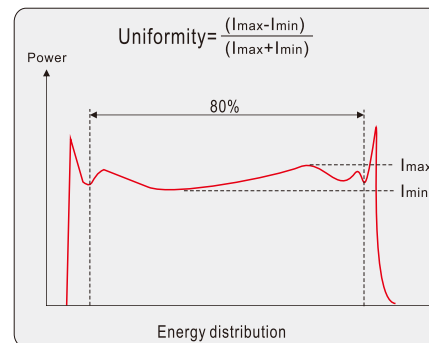
Item#	Diameter	Height	Fan angle
PL-6-10	Ø6.0	5.0	10°
PL-6-20	Ø6.0	5.0	20°
PL-6-30	Ø6.0	5.0	30°
PL-6-45	Ø6.0	5.0	45°
PL-6-60	Ø6.0	5.0	60°
PL-6-75	Ø6.0	5.0	75°
PL-6-90	Ø6.0	5.0	90°
PL-6-100	Ø6.0	5.0	100°

### 9.0mm lenses

Item#	Diameter	Height	Fan angle
PL-9-10	Ø9.0	8.5	10°
PL-9-20	Ø9.0	8.5	20°
PL-9-30	Ø9.0	8.5	30°
PL-9-45	Ø9.0	8.5	45°
PL-9-60	Ø9.0	8.5	60°
PL-9-75	Ø9.0	8.5	75°
PL-9-90	Ø9.0	8.5	90°
PL-9-100	Ø9.0	8.5	100°

Notes:

- 1, Please specify beam size and incidence direction.
- 2, The listed lenses are without coating.
- 3, Rectangular shape is available.



## Windows

Windows are glass with parallel surfaces used to enable optical radiation to pass from one environment to another without allowing environments to mix. Material, transmission, scattering, wavefront distortion, damage threshold and resistance to certain environments should be considered when selecting windows.

### Materials:

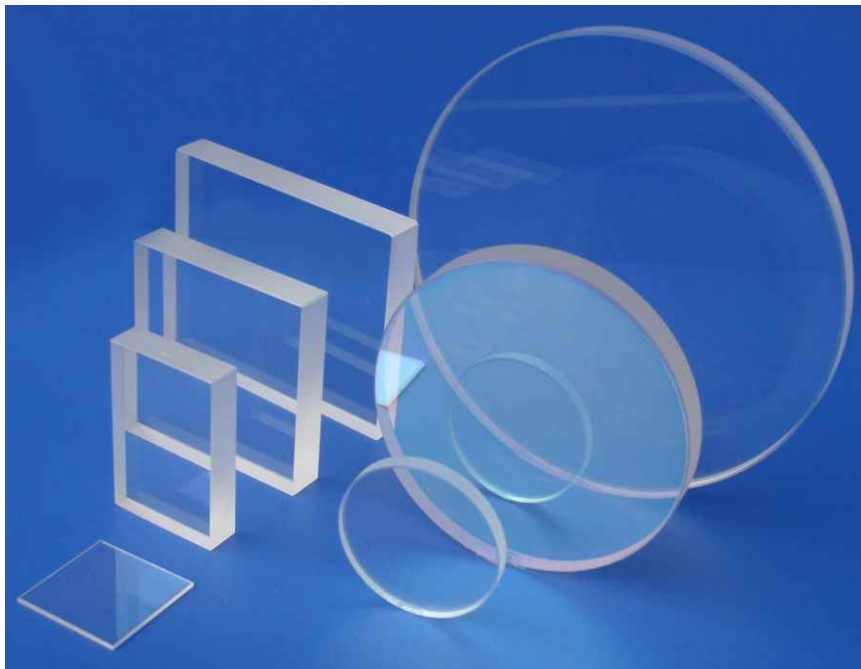
N-BK7, UV Fused silica, B270, Float glass, CaF2, Sapphire, MgF2.

### Manufacturing capability

Dimensional tolerance	0.01mm
Surface quality	10-5 S/D
Parallelism	2 arcsec
Flatness	$\lambda/10$ @633nm

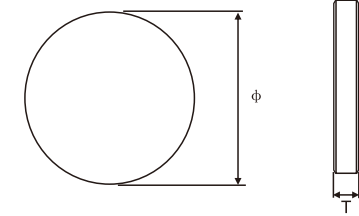
Custom  
Design

Price  
On request



### BK7 Windows

Dimensional tolerance:  $\pm 0.1$ mm  
 Surface quality: 40-20 S/D  
 Parallelism: 3 arcmin  
 Flatness:  $\lambda/4$  @ 633nm  
 Protective bevel: Protective bevel



Item#	Material	Diameter	Thickness
WIN01-10.0x1	N-BK7	Ø10.0	1.0
WIN01-12.7x2	N-BK7	Ø12.7	2.0
WIN01-15.0x2	N-BK7	Ø15.0	2.0
WIN01-20.0x2	N-BK7	Ø20.0	2.0
WIN01-25.4x3	N-BK7	Ø25.4	3.0
WIN01-30.0x3	N-BK7	Ø30.0	3.0
WIN01-38.1x3	N-BK7	Ø38.1	3.0
WIN01-50.8x5	N-BK7	Ø50.8	5.0

Custom  
Design

Price  
On request

### UV Fused silica Windows

Dimensional tolerance:  $\pm 0.1$ mm  
 Surface quality: 40-20 S/D  
 Parallelism: 3 arcmin  
 Flatness:  $\lambda/4$  @ 633nm  
 Protective bevel: Protective bevel

Item#	Material	Diameter	Thickness
WIN02-10.0x1	UV Fused silica	Ø10.0	1.0
WIN02-12.7x2	UV Fused silica	Ø12.7	2.0
WIN02-15.0x2	UV Fused silica	Ø15.0	2.0
WIN02-20.0x2	UV Fused silica	Ø20.0	2.0
WIN02-25.4x3	UV Fused silica	Ø25.4	3.0
WIN02-30.0x3	UV Fused silica	Ø30.0	3.0
WIN02-38.1x3	UV Fused silica	Ø38.1	3.0
WIN02-50.8x5	UV Fused silica	Ø50.8	5.0

### Notes:

- 1, The listed windows are without coating, please contact us for coating.
- 2, Custom windows are available upon request.

## CaF2 Windows (IR grade, UV grade)

Calcium fluoride is commonly used as a window material for both infrared and ultraviolet wavelengths, since it is transparent in these regions (about 0.15 $\mu$ m to 9 $\mu$ m) and exhibits extremely weak birefringence.

We provide artificially-crystallized calcium fluoride components available in IR grade and UV Grade. The cost of UV grade is much expensive than IR grade.

Dimensional tolerance:  $\pm 0.1$ mm  
 Surface quality: 60-40 S/D  
 Parallelism: 3 arcmin  
 Flatness:  $\lambda/2 @ 633$ nm  
 Protective bevel Protective bevel

Item #	Material	Diameter	Thickness
WIN03-12.7x2	CaF2, IR grade	$\varnothing 12.7$	2.0
WIN03-15.0x2	CaF2, IR grade	$\varnothing 15.0$	2.0
WIN03-25.4x2	CaF2, IR grade	$\varnothing 25.4$	2.0
WIN03-25.4x3	CaF2, IR grade	$\varnothing 25.4$	3.0
WIN03-30.0x3	CaF2, IR grade	$\varnothing 30.0$	3.0

Custom  
Design

Price  
On request

## Sapphire Windows

Dimensional tolerance:  $\pm 0.1$ mm  
 Surface quality: 80-50 S/D  
 Parallelism: 3 arcmin  
 Flatness:  $1\lambda @ 633$ nm  
 Protective bevel Protective bevel

Item #	Material	Diameter	Thickness
WIN04-12.7x2	Sapphire	$\varnothing 12.7$	2.0
WIN04-15.0x2	Sapphire	$\varnothing 15.0$	2.0
WIN04-25.4x2	Sapphire	$\varnothing 25.4$	2.0
WIN04-25.4x3	Sapphire	$\varnothing 25.4$	3.0
WIN04-30.0x3	Sapphire	$\varnothing 30.0$	3.0

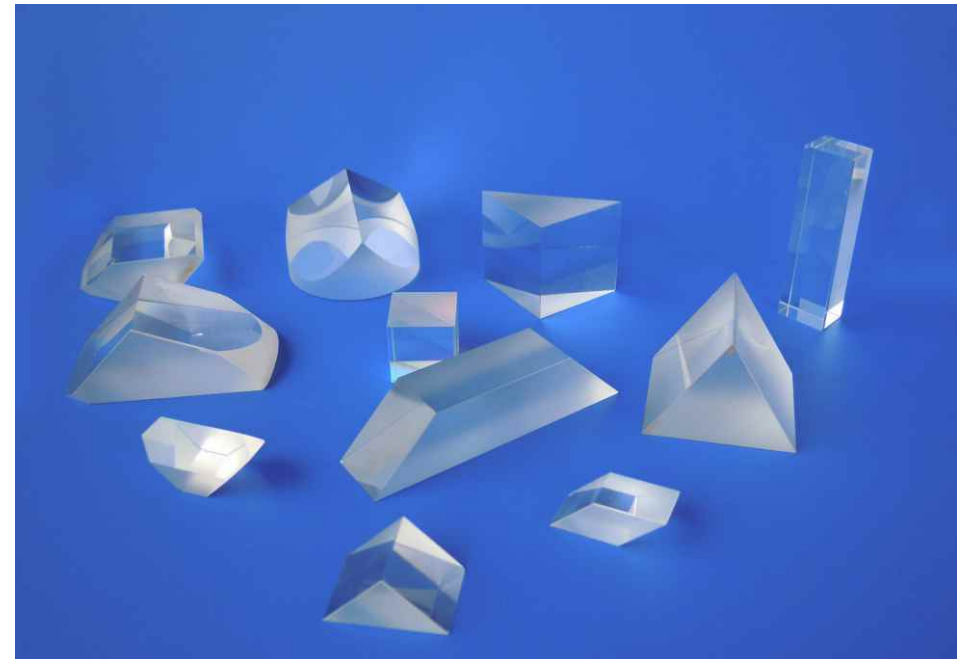
## Prisms

Prism is optical element with flat, polished surfaces that refract light. At least two of flat surface must have an angle between them. The exact angles between the surfaces depend on the application.

### Manufacturing capability of Prisms

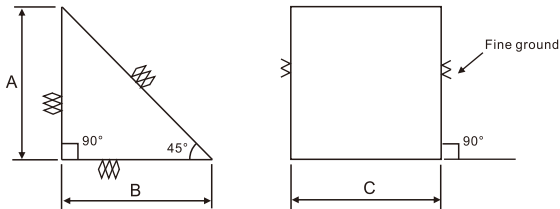
Dimensional tolerance	0.01mm
Surface quality	10-5 S/D
Angle tolerance	3 arcsec
Flatness	$\lambda/10 @ 633$ nm

- \* Right angle Prisms
- \* Wedge Prisms
- \* Corner cube Retro-reflectors
- \* Roof Prisms
- \* Dove Prisms
- \* Penta Prisms
- \* Dispersive Prisms
- \* Rhomboid Prisms
- \* Abbe prisms
- \* Pellin-Broca prisms
- \* Amici prisms
- \* Porro prisms
- \* Schmidt Pechan prisms



## Right Angle Prisms

Right angle prisms are most popular of all prisms. Right angle prisms are used to deviate beam through 90°, when beam enters normal to right sides, and as also a retroreflector to deviate beam through 180° when beam enters normal to hypotenuse.



Dimensional tolerance:  $\pm 0.1\text{mm}$   
 Surface quality: 40-20 S/D  
 Flatness:  $\lambda/4@632.8\text{nm}$   
 Angular tolerance:  $\pm 3\text{ arcmin}$   
 Bevel: Protective

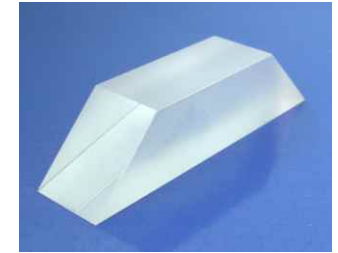
Item#	Material	Size(AxBxC)	Item#	Material	Size(AxBxC)
PRA01-5.0	BK7	5.0x5.0x5.0	PRA02-5.0	Fused silica	5.0x5.0x5.0
PRA01-10.0	BK7	10.0x10.0x10.0	PRA02-10.0	Fused silica	10.0x10.0x10.0
PRA01-12.7	BK7	12.7x12.7x12.7	PRA02-12.7	Fused silica	12.7x12.7x12.7
PRA01-15.0	BK7	15.0x15.0x15.0	PRA02-15.0	Fused silica	15.0x15.0x15.0
PRA01-20.0	BK7	20.0x20.0x20.0	PRA02-20.0	Fused silica	20.0x20.0x20.0
PRA01-25.4	BK7	25.4x25.4x25.4	PRA02-25.4	Fused silica	25.4x25.4x25.4
PRA01-30.0	BK7	30.0x30.0x30.0	PRA02-30.0	Fused silica	30.0x30.0x30.0
PRA01-38.0	BK7	38.0x38.0x38.0	PRA02-38.0	Fused silica	38.0x38.0x38.0
PRA01-50.8	BK7	50.8x50.8x50.8	PRA02-50.8	Fused silica	50.8x50.8x50.8

Note:  
 1, The listed prisms are without coating, please contact us for coating.

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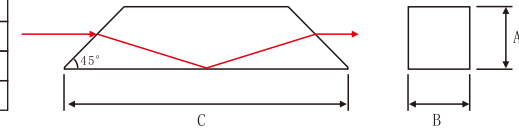
## Dove Prisms

Dove prisms can be used as an image rotator, the output image rotates through twice the angle that the prism rotates through. Dove prism also can be used as a retroreflector.



Dimensional tolerance:  $\pm 0.1\text{mm}$   
 Surface quality: 60-40 S/D  
 Flatness:  $\lambda/2@632.8\text{nm}$   
 Bevel: Protective bevel

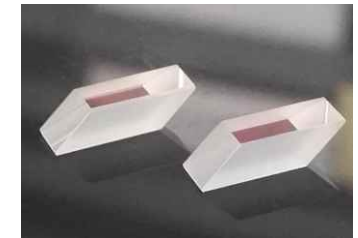
Item #	Material	AXB	C
PDV01-10	BK7	10.0x10.0	42.2
PDV01-15	BK7	15.0x15.0	63.4
PDV01-20	BK7	20.0x20.0	84.5
PDV01-25	BK7	25.0x25.0	105.7



[Custom Design](#)   [Price On request](#)

## Rhomboid Prisms

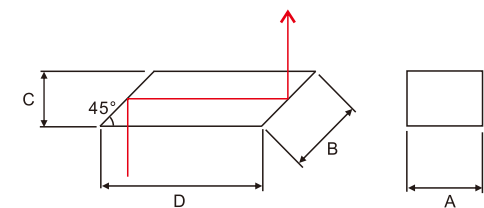
Rhomboid prism is used to displace a laser beam without changing its direction. The displacement is equal to the length of the prism.



Material: N-BK7  
 Dimensional tolerance:  $\pm 0.1\text{mm}$   
 Surface quality: 60-40 S/D  
 Flatness:  $\lambda/4@632.8\text{nm}$   
 Bevel: Protective bevel

Parallelism of input and output beam: 30"

Item#	AXB	C	D
PRB1-5.0	5.0x5.0	3.5	7.1
PRB1-10.0	10.0x10.0	7.1	14.1
PRB1-15.0	15.0x15.0	10.5	21.2
PRB1-20.0	20.0x20.0	14.2	28.3
PRB1-25.0	25.0x25.0	17.7	35.4



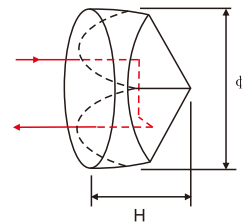
### Corner Retroreflectors

Corner cube retroreflector has three mutually orthogonal reflecting surfaces. The corner cube reflect any light rays back towards their source. The reflection angle 180° is independent of the orientation of the corner cube, making it ideal where precision alignment is difficult.



Material: N-BK7  
 Dimensional tolerance: ±0.1mm  
 Surface quality: 40-20 S/D  
 Surface flatness: λ/8@632.8nm  
 Bevel: Roof edges un-beveled, chip <0.1mm other edge Protective bevel  
 Optional Coatings:  
 Reflective surfaces: Silver/Aluminum coating + Black paint  
 Front surface: Anti-reflective coating

Item#	Diameter	Height	Deviation
PCR1-12.7	Ø12.7	10.2	5"
PCR1-15.0	Ø15.0	11.4	5"
PCR1-25.4	Ø25.4	19.1	5"
PCR1-38.1	Ø38.1	29.1	5"
PCR1-50.8	Ø50.8	38.1	5"

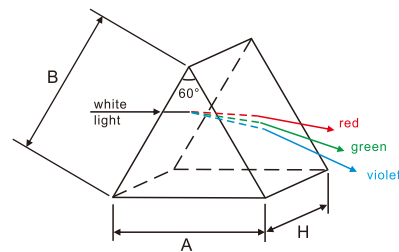


### Equilateral Dispersing Prisms

Equilateral prisms is an optics with polished surfaces. The three surfaces are 60° to each other, and are mostly used to disperse the spectrum, that is, to break light up into its spectral components (the colors of the rainbow). This dispersion occurs because the angle of refraction is dependent on the refractive index.



Material: N-SF11  
 Dimensional tolerance: ±0.1mm  
 Surface quality: 60-40 S/D  
 Flatness: λ/2@633nm  
 Bevel: Protective bevel  
 Three Angles: θ=60°  
 Angular tolerance: 3'

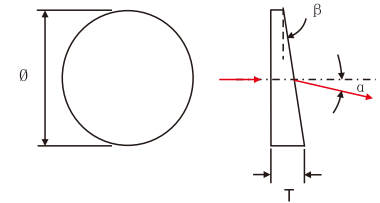


Item#	AxBxC(mm)	Thickness
PED1-15.0	15.0x15.0x15.0	15.0
PED1-25.4	25.4x25.4x25.4	25.4
PED1-38.1	38.1x38.1x38.1	38.1

### Wedge Prisms

Wedge prism is used individually to deviate a beam through some specified angles. When used in pairs, the wedge prisms can steer a beam anywhere within a circle described by full angle 4 α , where α is the deviation from a single prism. The beam steering is accomplished by rotating the two wedge prisms independently of each other .

Material: N-BK7  
 Design wavelength: 632.8nm, n=1.51467  
 Dimensional tolerance: ±0.1mm  
 Surface quality: 60-40  
 Flatness: λ/4@632.8nm  
 Wedge tolerance: ±1 arcmin  
 Thickness of thin edge: 3.0mm  
 Bevel: Protective bevel



Item#	Diameter	Thickness	Deviation(α)	Wedge angle (β)
PWG1-1	Ø25.4	3.86	1°	1°57'
PWG1-2	Ø25.4	4.72	2°	3°53'
PWG1-4	Ø25.4	6.43	4°	7°41'
PWG1-6	Ø25.4	8.11	6°	11°21'
PWG1-8	Ø25.4	9.74	8°	14°51'

Notes:

1, The listed prisms are without coating, please contact us for coating.



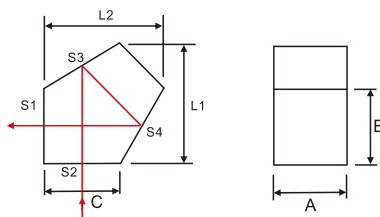
Custom Design

Price On request

### Penta Prisms

Penta prisms are used to deviate an incident beam 90° independent of small positional changes of the prism with respect to the beam. The image is neither inverted nor reversed.

- Material: N-BK7
- Dimensional tolerance: ±0.1mm
- Surface quality: 60-40 S/D
- Flatness: λ/4@632.8nm
- Bevel: Protective bevel
- Surface S1 & S2: Single layer MgF<sub>2</sub> coating
- Surface S3 & S4: Aluminized and painted black



Deviation 90° accuracy:

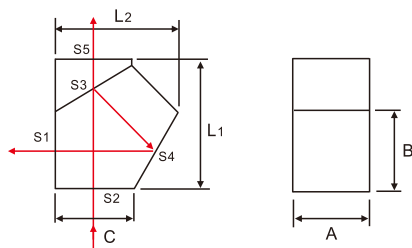
<10"	<15"	<30"	<1'
------	------	------	-----

Item#	AxBxC (mm)	L1=L2	Accuracy
PPT1-7	6x7x7	9.9	5"
PPT1-10	10x10x10	14.14	5"
PPT1-15	15x15x15	21.21	5"
PPT1-20	20x20x20	28.28	5"
PPT1-30	30x30x30	42.42	5"



### Beamsplitter Penta Prisms

Penta prisms are used to deviate an incident beam 90° independent of small positional changes of the prism with respect to the beam. The image is neither inverted nor reversed.



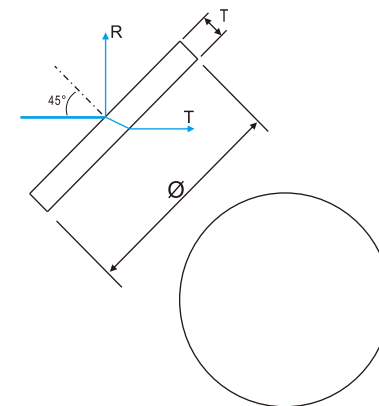
Custom Design

Price On request

### Plate Beamsplitters

Plate Beamsplitters are part-mirrors that reflect part of incident energy and transmit the rest.

- Material: N-BK7
- Dimensional tolerance: ±0.1mm
- Parallelism: 3 arc min
- Surface quality: 60-40 S/D
- Surface flatness: λ/4@632.8nm
- Clear aperture: >90%
- Bevel: Protective bevel
- Front surface: Partial reflective coating
- Back surface: AR coating



Incident of angle: 45°  
 Reflectance/Transmittance: R/T=50/50±5%

(R, T are the average of S- and P-pol)

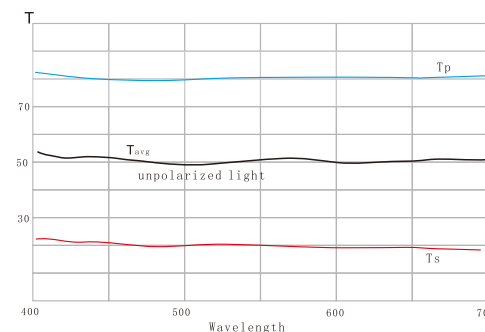
Other ratio is available

Polarization Sensitive

Item #	Dimensions	Wavelength
BPP10-A	Ø10.0x3.0	430-680nm
BPP12-A	Ø12.7x3.0	430-680nm
BPP15-A	Ø15.0x3.0	430-680nm
BPP20-A	Ø20.0x3.0	430-680nm
BPP25-A	Ø25.4x3.0	430-680nm

Custom Design

Price On request



### Cube Beamsplitters

The beamsplitter cubes are constructed by cemented two matched right angle prisms. The hypotenuse is coated with partial dielectric coating.

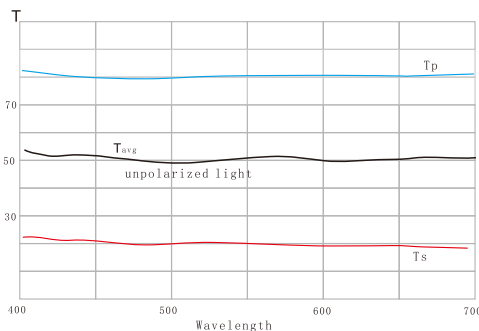
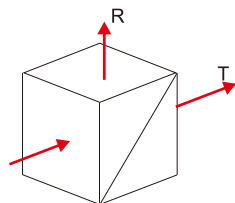
- ※ Easy to mount
- Less deformation.

Cube Beamsplitters are recommended for use with collimated or nearly collimated beam. Convergent or divergent beam will contribute spherical aberration.

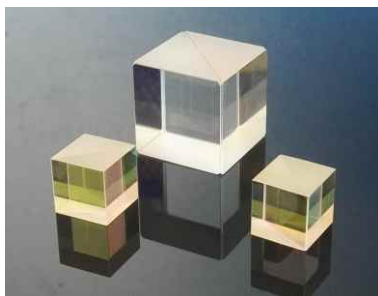
Material	N-BK7
Dimension tolerance	±0.1mm
Beam deviation	3 arc min
Surface quality	60-40 S/D
Surface flatness	λ/4@632.8nm
Clear aperture	>90%
Bevel	Protective bevel
Hypotenuse surface	Partial reflective coating
Entrance/Exit surfaces	AR coating

Incident of angle: 0°±2°  
 Reflectance/Transmittance: R/T=50/50±5%

Item #	Dimensions	Wavelength
BPC10-A	10.0x10.0x10.0	450-680nm
BPC12-A	12.7x12.7x12.7	450-680nm
BPC15-A	15.0x15.0x15.0	450-680nm
BPC20-A	20.0x20.0x20.0	450-680nm
BPC25-A	25.4x25.4x25.4	450-680nm



R and T are the average of S- and P-pol, other ratio is available,



Custom Design

Price On request

### Non-polarizing Beamsplitters(NPBS)

Non-polarizing beamsplitter cube are constructed by cemented two right angle prisms. The hypotenuse of one prism is coated with hybrid metal dielectric coating, which exhibits moderate absorption with little polarization sensitivity.

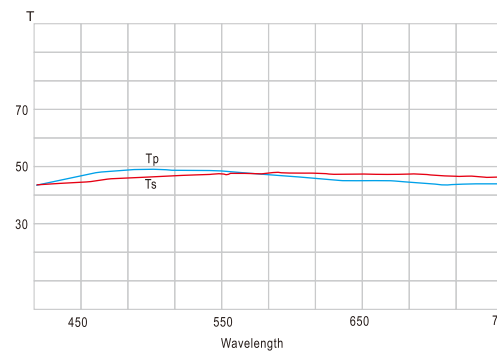
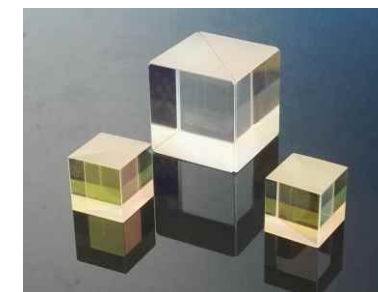
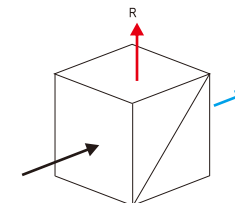
The beamsplitters are fairly insensitive to changes in angle of incidence. Performance is relatively flat across a large spectral band.

Material	N-BK7
Dimension tolerance	±0.1mm
Beam deviation	3 arc min
Surface quality	60-40 S/D
Surface flatness	λ/4@632.8nm
Clear aperture	>90%
Bevel	Protective bevel
Coating on hypotenuse	Hybrid metallic dielectric coating
Entrance & exit faces	AR coating

Incidence of angle 0°±2°  
 Reflectance/Transmittance R/T=50/50%,  
 Tp(Ts)=50±5%  
 Rp(Rs)=50±5%

Energy absorption: <10%

Item #	Dimensions	Wavelength
N-PBS10-A	10.0x10.0x10.0	450-680nm
N-PBS12-A	12.7x12.7x12.7	450-680nm
N-PBS15-A	15.0x15.0x15.0	450-680nm
N-PBS20-A	20.0x20.0x20.0	450-680nm
N-PBS25-A	25.4x25.4x25.4	450-680nm



Custom Design

Price On request

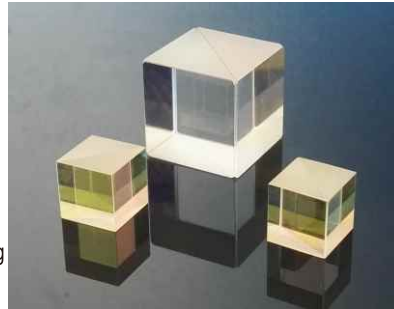
## Polarization Beamsplitters (PBS)

Polarization beamsplitter cubes are constructed by cemented two right angle prisms, the hypotenuse of one prism is coated with polarization dielectric coating.

When used with normal incident, un-polarized light, the incident beam is separated into two polarized beams, p-polarized component is passed straight through, s-polarized component is reflected out at 90deg.

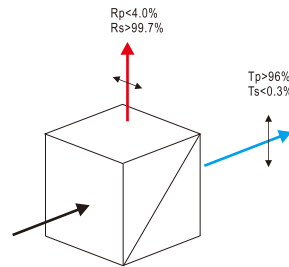
- Material: N-BK7 or N-SF2
- Dimensional tolerance:  $\pm 0.1\text{mm}$
- Beam deviation: 3 arc min
- Surface quality: 60-40 S/D
- Surface flatness:  $\lambda/4@632.8\text{nm}$
- Clear aperture:  $>90\%$
- Bevel: Protective bevel
- Hypotenuse: Polarization dielectric coating
- Entrance & exit faces: AR coating

Incidence of angle:  $0^\circ \pm 2^\circ$



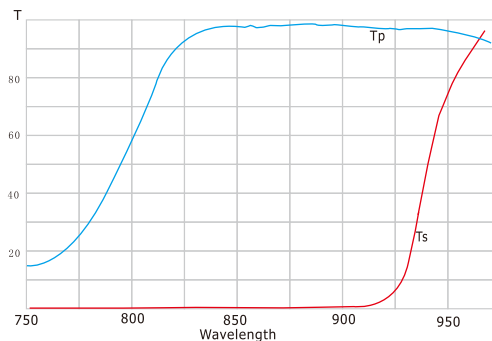
### Laser line design

- Typical extinction ratio: 1000:1
- Transmittance:  $T_p > 97\%$  and  $T_s < 0.1\%$
- Reflectance:  $R_p < 3\%$  and  $R_s > 99.5\%$



### Broadband wavelength design

- Typical extinction ratio: 100:1
- Wavelength range: 450--700nm, 700-900nm, 900-1200nm
- Transmittance  $T_p > 95\%$  and  $T_s < 1\%$
- Reflectance  $R_p < 5\%$  and  $R_s > 99\%$

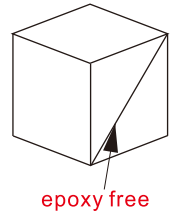


Item #	Dimensions	Wavelength
PBS05	5.0x5.0x5.0	please specify
PBS10	10.0x10.0x10.0	please specify
PBS12	12.7x12.7x12.7	please specify
PBS15	15.0x15.0x15.0	please specify
PBS20	20.0x20.0x20.0	please specify
PBS25	25.4x25.4x25.4	please specify

## High power Polarization Beamsplitters

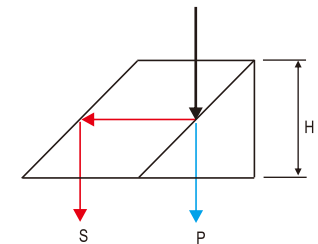
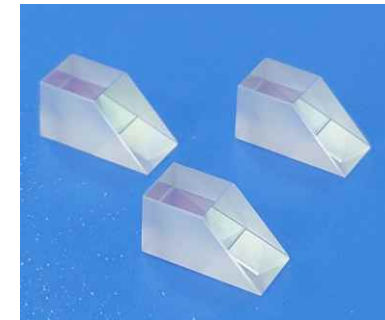
Typical Polarization beamsplitter cubes are only recommended for low power application, because the cubes are cemented with UV glue. which can not withstand high power energy for long time.

CeNing offers optically contact polarizing beamsplitter cubes for high power application. the beamsplitter interface uses epoxy-free, optically contact bond which minimized absorption and scattering loss.



## Displacement Polarization Beamsplitters

the displacement polarization beamsplitter output two parallel beams, the beamsplitters consists of a rhomboid prism and right angle prism.



Custom Design

Price On request



## Aluminum coated Mirrors (Vis-Enhanced, UV-Enhanced)

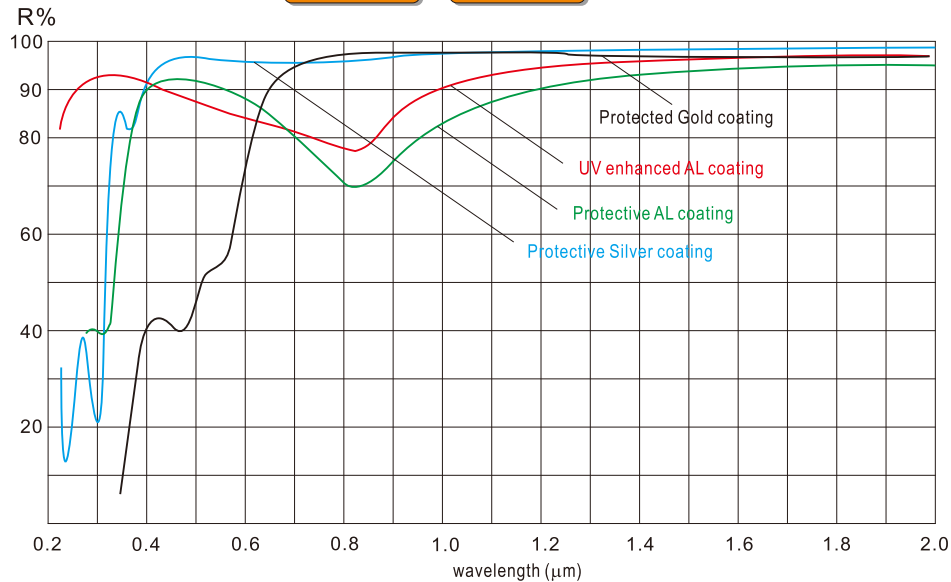
Protected Aluminum coated mirrors are a good option for many general broadband applications. An SiO<sub>2</sub> coating is used to protect the delicate aluminum coating, making it suitable for laboratory and industrial use. The protected aluminum coating has a smaller chance of tarnishing than protected silver in a high humidity environment, and gives a reflectance that most closely matches the reflectance of a bare aluminum coating. These mirrors have an average reflectance greater than 90% from 450 nm to 2 μm and greater than 95% over the 2 to 20 μm spectral range. Please see the Graphs tab for reflectance curves.

UV enhanced Aluminum coated mirrors offers >90% reflectance from 250 to 450 nm.

## Silver coated Mirrors

Silver coated mirrors offer the highest reflectance in the visible-NIR spectrum of any metallic mirror, while also offering high reflectance in the IR (see table below for details). Please see the Graphs tab above for reflectance curves. In order to protect them from oxidation, these mirrors have a durable SiO<sub>2</sub> overcoat with an approximate thickness of 100 nm. Though the overcoat helps to protect silver from tarnishing, high humidity environments should be avoided.

Custom Design Price On request



## Gold coated Mirrors

Protected gold is ideal for use in the IR wavelength range. A protective dielectric overcoat is layered over the gold to help protect it from damage and make cleaning easier. These optics provide >96% average reflectance from 800 nm to 20 μm. Like other mirrors with metallic coatings, these mirrors are relatively insensitive to angle of incidence, as seen in the reflectance curves on the Graphs tab

**Substrate Materials:** N-BK7, UV Fused silica

Dimensional tolerance: ±0.1mm

Surface quality: 60-40 S/D

Parallelism: 3 arcmin

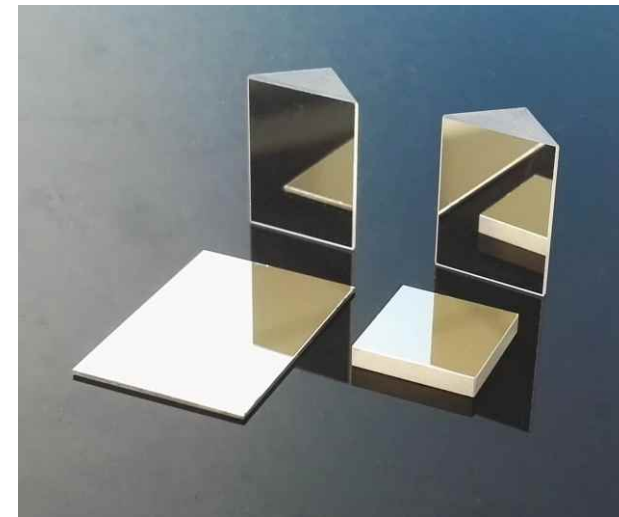
Flatness: λ/4 @ 633nm

Protective bevel Protective bevel

Custom Design

Price On request

Item #	Diameter	Thickness	Coating type
MR-12x3	Ø12.7	3.0	please specify
MR-25x3	Ø25.4	3.0	please specify
MR-30x3	Ø30.0	3.0	please specify
MR-38x3	Ø38.1	3.0	please specify
MR-50x3	Ø50.8	5.0	please specify



# Dielectric coated Mirrors

Dielectric coated mirrors exhibit very excellent reflectance at specified wavelength range with high laser damage threshold.

We offer dielectric coated mirrors for laser lines, narrowband and broadband wavelength ranges covering spectrum from UV to IR.

To order mirrors, please select substrate material and specify coating spec. CeNing offers a variety of substrates and material, Wide selection of round, rectangular, elliptical or custom shape mirrors with flat, spherical concave or convex and cylindrical surfaces are available.



Custom Design

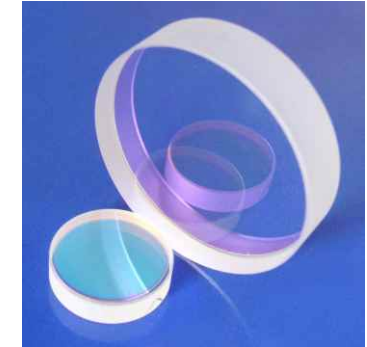
Price On request

	typical Grade	Laser Grade
Dimensional tolerance	±0.1mm	±0.1mm
Surface quality	40-20 S/D	10-5 S/D
Flatness	λ/4 @ 633nm	λ/10 @ 633nm
Bevel	Protective bevel	Protective bevel

Custom Design

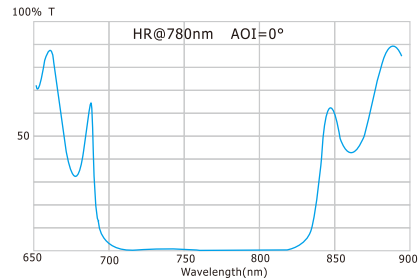
Price On request

Item#	Material	Diameter	Thickness
MR-12.7x3	N-BK7	Ø12.7	3.0
MR-15.0x3	N-BK7	Ø15.0	3.0
MR-25.4x3	N-BK7	Ø25.4	5.0
MR-30.0x3	N-BK7	Ø30.0	5.0
MR-38.1x3	N-BK7	Ø38.1	6.3
MR-50.8x5	N-BK7	Ø50.8	6.3

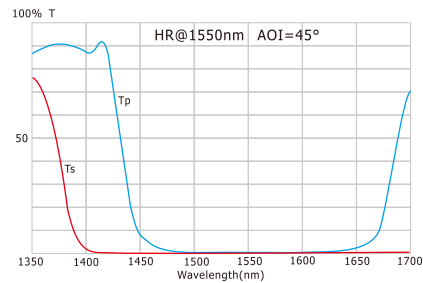


## Typical Mirror coatings

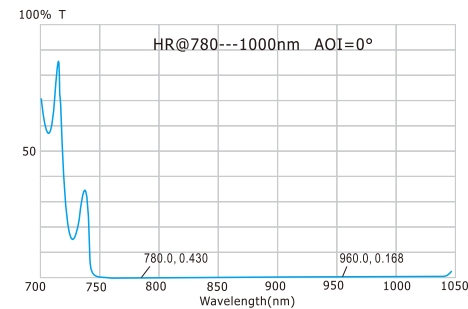
Narrow spectral range, Laser line  
Angle of incidence (0°)



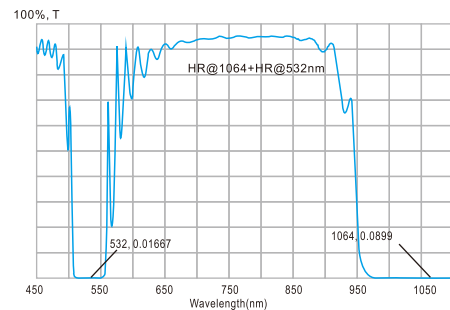
Narrow spectral range, Laser line  
Angle of incidence (45°)



Broadband spectral range reflection  
Angle of incidence (0° or 45°)

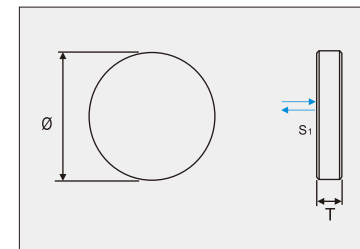


Dual wavelength Reflection  
Angle of incidence (0° or 45°)

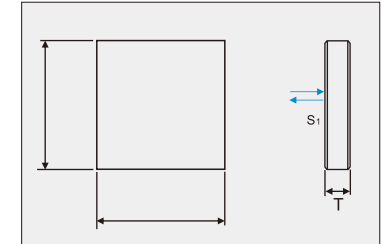


Dual Wavelength HR Coating, 0° Incidence

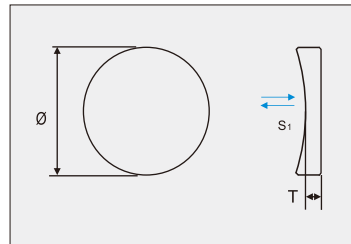
Flat Round



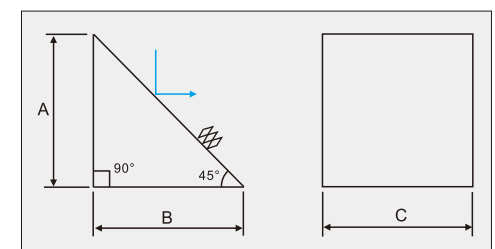
Flat Square



Plano-Concave Round



Right-angle Prism Mirrors



## Dichroic Mirrors

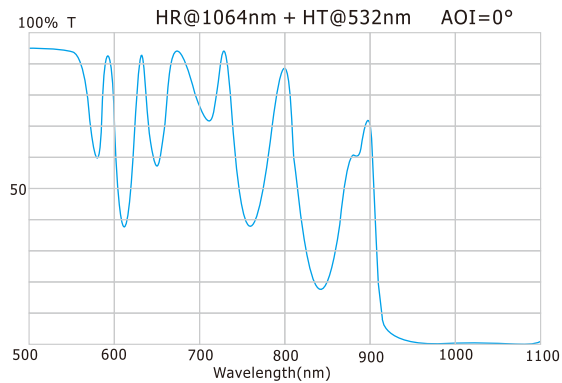
Dichroic mirrors are designed to spectrally separate light by transmitting and reflecting light. The mirrors feature a dichroic coating on one surface and an anti-reflection coating on rear surface.

**Substrate Materials:** N-BK7, UV Fused silica

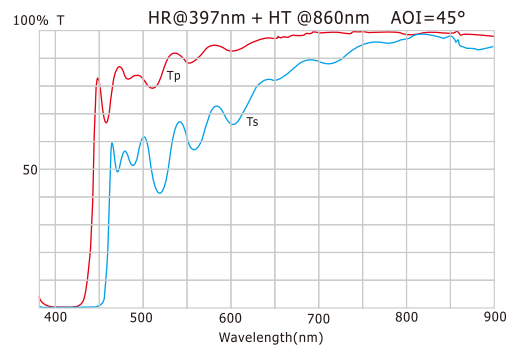
Dimensional tolerance:  $\pm 0.1\text{mm}$   
 Surface quality: 40-20 S/D  
 Parallelism: 3 arcmin  
 Flatness:  $\lambda/4 @ 633\text{nm}$   
 Protective bevel Protective bevel

**Typical coating**

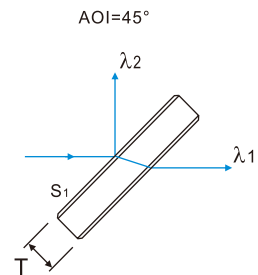
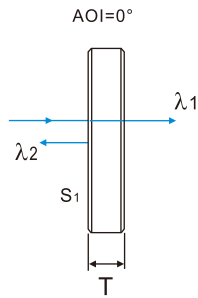
Front surface(S1): High reflective @ wavelength-1 and High transmission @wavelength-2  
 Rear surface(S2): AR @wavelength-2  
 Angle of incidence  $0^\circ$  or  $45^\circ$



Short wavelength pass



Long wavelength pass



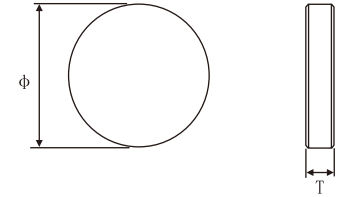
Custom Design

Price On request

## Colored Glass Filters

CeNing Optics offers a variety of colored glass filters that are manufactured from Schott glass and Guoguang glass (China). The colored glass filters include bandpass filters, long pass filters and neutral density filters etc.

Material Schott, Hoya colored glass or equivalent  
 Dimension tolerance  $\pm 0.1\text{mm}$   
 Parallelism 3 arcmin  
 Surface flatness  $\lambda/2$  per 25mm  
 Surface quality 60-40 S/D



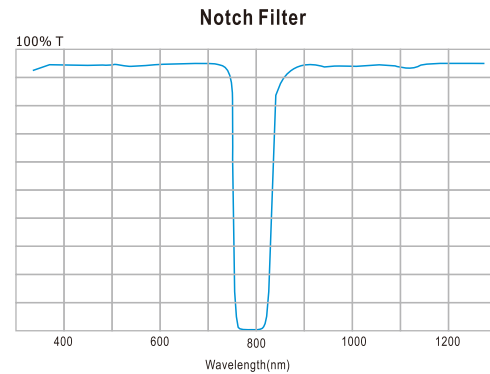
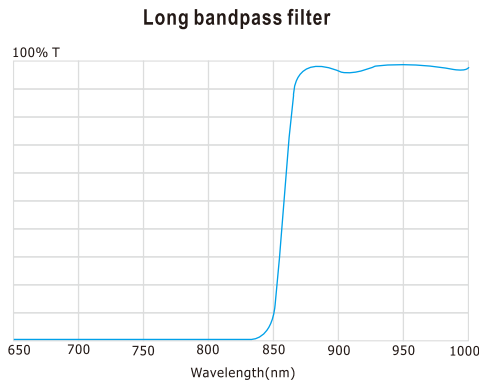
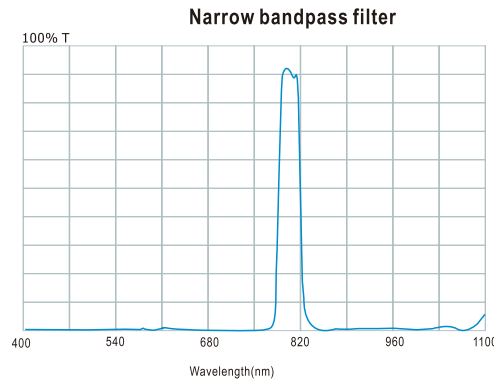
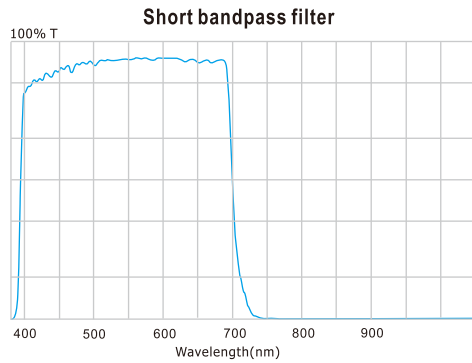
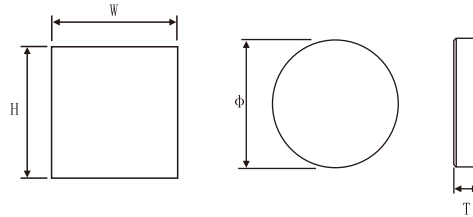
Custom Design

Price On request

## Interference Filters

Interference filters only allow a desired range of wavelength passed through, while simultaneously blocking both longer and shorter wavelengths. CeNing offers dielectric-coated spectral filters including longpass filter, short pass filter, narrow bandpass filters and notch filters. The filter coating are made with ion-assisted deposition method.

Material Bk7, B270, Float glass  
 Dimension tolerance  $\pm 0.1\text{mm}$   
 Parallelism 3 arcmin  
 Flatness  $\lambda/2 @ 633\text{nm}$   
 Surface quality 60-40 S/D

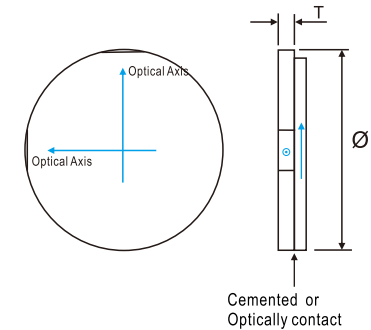


## Zero Order Waveplates

Zero order waveplates are constructed of two multiple order waveplates with their axes crossed. Thus the effect of first plate is canceled by the second, except for the residual difference between them.

Zero order waveplates are much less susceptible to wavelength and temperature changes. Zero-order waveplates are frequently preferred to use despite their somewhat higher cost: They maintain optimum performance across a much larger range of temperatures and wavelengths. For use with laser diodes having variable wavelength, or in instruments that warm up over time, or in locations subject to the environment, their stability is paramount.

Material Quartz  
 Dimension tolerance  $\pm 0.1\text{mm}$   
 Parallelism 2 arc sec  
 Surface quality 20-10 S/D  
 Wavefront distortion  $\lambda/8 @ 632.8\text{nm}$   
 Retardation accuracy  $\lambda/300$   
 Clear aperture  $> 90\%$   
 Coating on both sides  $R < 0.25\% @ \text{design wavelength}$



### Typical Retardation

$\lambda/4$	$\lambda/2$	$1\lambda$	$\lambda/8$
-------------	-------------	------------	-------------

### Typical Diameters

$\varnothing 5.0$	$\varnothing 10.0$	$\varnothing 12.7$	$\varnothing 15.0$
$\varnothing 20.0$	$\varnothing 25.4$	$\varnothing 30.0$	$\varnothing 38.1$

Thickness: approx 0.8-2.0mm



Zero order Waveplates are available in three types:

1. Cemented
2. Optically contact,
3. Air spaced.

Cement type: Two single parts are cemented with UV glue.  
 Optically contact type: The surfaces of two parts are bonded to each other through the mutual attraction of Van der Waals forces. Recommended for high power application.

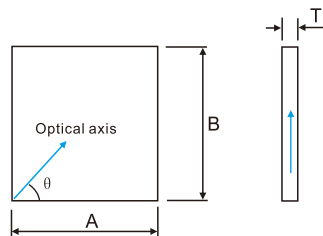
Custom Design

Price On request

### True Zero Order Waveplates

True order waveplate is designed for wavelength range 1300-- 1700nm for telecom application. These waveplates provide best possible angle, temperature and wavelength performance. The thickness of these waveplates are very thin (approx 100µm).

- Material: Quartz
- Dimension tolerance: ±0.1mm
- Parallelism: 1 arc sec
- Surface quality: 20-10 S/D
- Wavefront distortion: λ/8@632.8nm
- Retardation tolerance: λ/300
- Clear aperture: >90%
- Coating on both sides: R<0.25% @ design wavelength



typical θ= 22.5°, 45°

#### Typical Sizes

Square	Round	Thickness
1.0x1.0	Ø1.0	0.03--0.10
2.0x2.0	Ø2.0	0.03--0.10
3.0x3.0	Ø3.0	0.03--0.10
5.0x5.0	Ø5.0	0.03--0.10

Thickness: approx <0.1mm

#### Typical Retardation

λ/4	λ/2
-----	-----

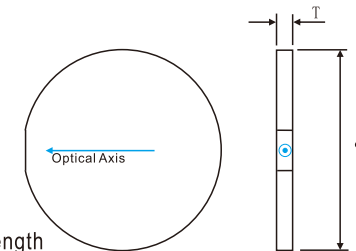
Custom Design

Price On request

### Multiple Order Waveplates

Multiple order waveplates are made from a single crystalline plate, which are designed to give a retardance of several full waves, plus the desired fraction. Multiple order waveplates are more susceptible to change in wavelength and they should not be used more than several nanometers outside of design wavelength.

- Material: Quartz
- Dimension tolerance: ±0.1mm
- Parallelism: 2 arc sec
- Surface quality: 20-10 S/D
- Wavefront distortion: λ/8@632.8nm
- Retardation accuracy: λ/200
- Clear aperture: >90%
- Coating on both sides: R<0.25% @ design wavelength



#### Typical Retardation

λ/4	λ/2	1λ	λ/8
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#### Typical Diameters

Ø5.0	Ø10.0	Ø12.7	Ø15.0
Ø20.0	Ø25.4	Ø30.0	Ø38.1

Thickness: approx 0.3-0.5mm



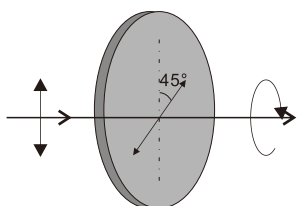
Mounted Waveplates are available.

Mounted size: Ø25.4mm

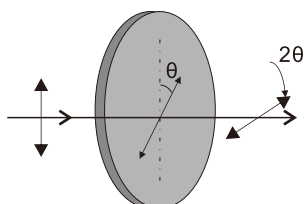
Custom Design

Price On request

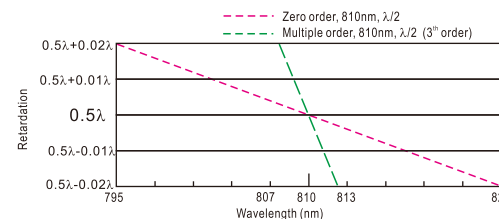
Quarter (λ/4) waveplate



Half (λ/2) waveplate



#### Comparison of Multiple order Waveplate and Zero order waveplate:



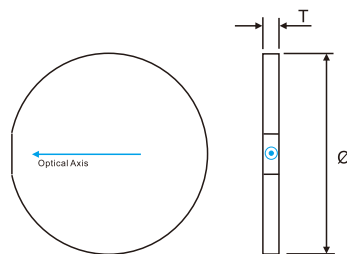
Temperature change from 10°C 35°C

	Variation of Retardation
Zero order λ/2, 633nm	0.02λ
7 <sup>th</sup> order λ/2, 633nm	0.65λ

## Dual Wavelength Waveplates

Dual wavelength waveplates are multiple order waveplate that provide a specific retardance at two different wavelengths. Its application is separation of different wavelengths with a polarization beamsplitter by rotating the polarization of one wavelength by 90deg, and leaving the other unchanged.

Material	Quartz
Dimension tolerance	$\pm 0.1$ mm
Parallelism	2 arc sec
Surface quality	20-10 S/D
Wavefront distortion	$\lambda/8@632.8$ nm
Retardation tolerance	$\lambda/100$
Clear aperture	>90%
Coating on both sides	$R < 0.25\%$ @ design wavelength



### Typical Retardation

$\lambda/4$	$\lambda/2$	$1\lambda$	$\lambda/8$
-------------	-------------	------------	-------------

### Typical Diameters

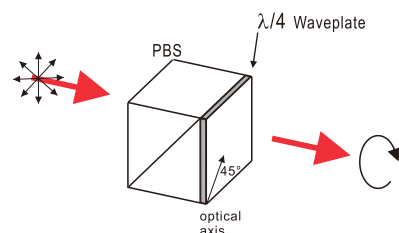
Ø5.0	Ø10.0	Ø12.7	Ø15.0
Ø20.0	Ø25.4	Ø30.0	Ø38.1

Thickness: approx 0.3-0.5mm



## Polarization Beamsplitters + Waveplate

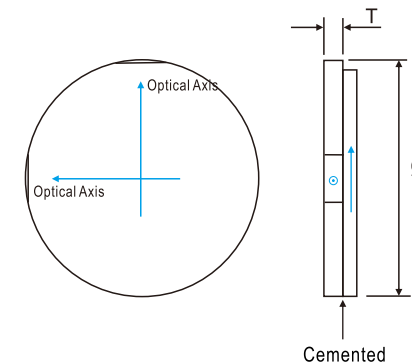
A quarter waveplate is cemented on one of exit faces of beamsplitter, the fast axis of waveplate is aligned at 45° to the side of cube. the output beam will be circularly polarized.



## Achromatic Waveplates

Achromatic Waveplates provide a constant phase shift independent of the incident wavelength of light. This wavelength independence is achieved by using two different birefringent crystalline materials. The relative shifts in retardation over the wavelength range are balanced between the two materials used.

Material	Quartz + MgF2
Dimension tolerance	$\pm 0.1$ mm
Parallelism	10 arc sec
Surface quality	20-10 S/D
Wavefront	$\lambda/4@632.8$ nm
Rotate tolerance	<5 arcmin
Clear aperture	>90%
Coating on both sides	AR coating



Typical Retardation:  $\lambda/2$   $\lambda/4$

Wavelength Ranges: 400-700nm,  
700-1000nm,  
950-1300nm,  
1200-1600nm

### Typical Diameters

Ø10.0	Ø12.7	Ø15.0	Ø20.0
Ø25.4	Ø30.0	Ø38.1	

Custom  
Design

Price  
On request

## Glan Taylor Polarizers

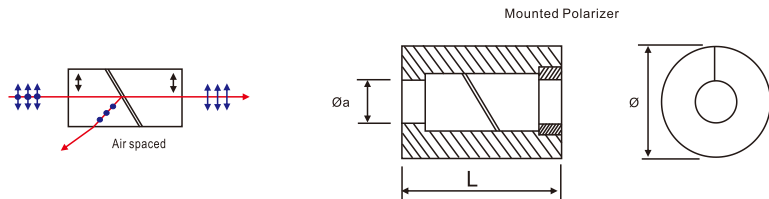
Polarizer is a device that produces linearly polarized light from other states of polarization. Glan Taylor polarizer consists two calcite prisms which are separated by an air space. Glan Taylor polarizer will divide an entering unpolarized beam into two rays, one is the extraordinary ray that is transmitted through the other side, another is the ordinary ray that is totally internally reflected and absorbed.

Material	Calcite	$\alpha$ -BBO
Wavelength	350-2300nm	190-3500nm
Extinction ratio	$5 \times 10^5 : 1$	$1 \times 10^6 : 1$
Angle field	$7.7^\circ$	$6^\circ$
Beam deviation	3 arcmin	3 arcmin
Dimension tolerance	$\pm 0.1\text{mm}$	$\pm 0.1\text{mm}$
Surface quality	20-10 S/D	20-10 S/D
Clear aperture	>90%	>90%
Coating on both sides	Single layer $\text{MgF}_2$	Single layer $\text{MgF}_2$

Custom Design

Price On request

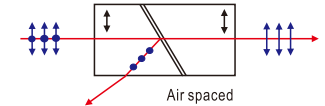
Item#	Material	Clear aperture $\varnothing a$ (mm)	Holder $\varnothing$ (mm)	Length (mm)	Application Wavelength
PZ1-C06	Calcite	6.0	15.0	15.0	350-2300nm
PZ1-C08	Calcite	8.0	25.4	17.0	
PZ1-C10	Calcite	10.0	25.4	19.0	
PZ1-C15	Calcite	15.0	30.0	23.0	
PZ1-B06	$\alpha$ -BBO	6.0	15.0	15.0	200--300nm 300--700nm 700-3000nm
PZ1-B08	$\alpha$ -BBO	8.0	25.4	17.0	
PZ1-B10	$\alpha$ -BBO	10.0	25.4	19.0	
PZ1-B15	$\alpha$ -BBO	15.0	25.4	23.0	500-4000nm
PZ1-Y08	YVO4	8.0	25.4	15.0	
PZ1-Y10	YVO4	10.0	25.4	17.0	



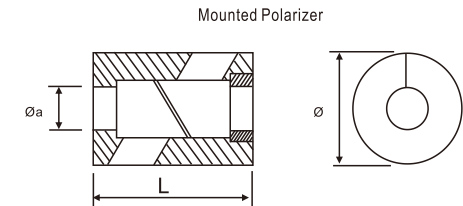
## Glan Laser Polarizers

Also called Glan laser polarizers, the polarizers are specially designed for high energy application. The side of housing are drilled two holes. The ordinary ray is reflected through an angle and exits the polarizers through one of the holes.

Material	Calcite	$\alpha$ -BBO
Wavelength	350-2300nm	190-3500nm
Extinction ratio	$5 \times 10^5 : 1$	$1 \times 10^6 : 1$
Angle field	$7.7^\circ$	$6^\circ$
Beam deviation	3 arcmin	3 arcmin
Dimension tolerance	$\pm 0.1\text{mm}$	$\pm 0.1\text{mm}$
Surface quality	20-10 S/D	20-10 S/D
Clear aperture	>90%	>90%
Coating on both sides	Single layer $\text{MgF}_2$	Single layer $\text{MgF}_2$



Item#	Material	Clear aperture $\varnothing a$ (mm)	Holder $\varnothing$ (mm)	Length (mm)	Application Wavelength
PZ2-C06	Calcite	6.0	15.0	15.0	350-2300nm
PZ2-C08	Calcite	8.0	25.4	17.0	
PZ2-C10	Calcite	10.0	25.4	19.0	
PZ2-C15	Calcite	15.0	30.0	23.0	
PZ2-B06	$\alpha$ -BBO	6.0	15.0	15.0	200--300nm 300--700nm 700-3000nm
PZ2-B08	$\alpha$ -BBO	8.0	25.4	17.0	
PZ2-B10	$\alpha$ -BBO	10.0	25.4	19.0	
PZ2-B15	$\alpha$ -BBO	15.0	25.4	23.0	500-4000nm
PZ2-Y08	YVO4	8.0	25.4	15.0	
PZ2-Y10	YVO4	10.0	25.4	17.0	



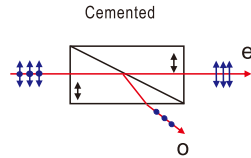
Custom Design

Price On request

## Glan Thompson Polarizers

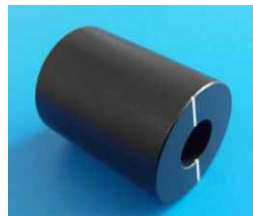
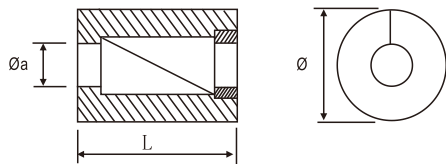
Glan Thompson polarizer consists two same calcite prisms which are cemented together. The extraordinary ray is transmitted, while ordinary ray is deflected and absorbed. Glan Thompson Polarizers are ideal choices for applications requiring a large field of view and high extinction ratio.

- Material: Calcite
- Extinction ratio:  $5 \times 10^5 : 1$
- Angle field:  $14-16^\circ$
- Beam deviation: 3 arcmin
- Dimension tolerance:  $\pm 0.1\text{mm}$
- Surface quality: 20-10 S/D
- Coating on both sides: Single layer  $\text{MgF}_2$



Item#	Material	Clear aperture $\varnothing a$ (mm)	Holder $\varnothing$ (mm)	Length (mm)	Application Wavelength
PZ3-C06	Calcite	6.0	15.0	22.0	350-2300nm
PZ3-C08	Calcite	8.0	25.4	28.0	
PZ3-C10	Calcite	10.0	25.4	33.0	
PZ3-C12	Calcite	12.0	25.4	39.0	

Mounted Polarizer



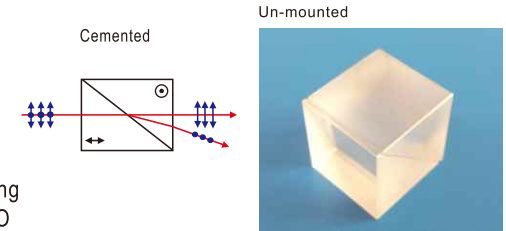
Custom Design

Price On request

## Rochon Polarizers

Rochon polarizers separate incident beam into ordinary ray and extraordinary ray like wollaston polarizer, but extraordinary ray is straight transmitted through, while ordinary is transmitted with a deviation angle.

- Material:  $\alpha$ -BBO, YVO4
- Extinction ratio:  $5 \times 10^5 : 1$
- Angle field:  $>6.9^\circ$
- Dimension tolerance:  $\pm 0.1\text{mm}$
- Surface quality: 20-10 S/D
- Coating on both sides: Single layer  $\text{MgF}_2$  coating
- Typical separation angle:  $8^\circ @ 1064\text{nm}$ ,  $\alpha$ -BBO

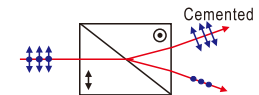


Item#	Material	Clear aperture $\varnothing a$ (mm)	Holder $\varnothing$ (mm)	Length (mm)	Application Wavelength
PZ5-B08	$\alpha$ -BBO	8.0	25.4	17.0	190-3500nm
PZ5-B10	$\alpha$ -BBO	10.0	25.4	19.0	
PZ5-B15	$\alpha$ -BBO	15.0	30.0	23.0	
PZ5-Y08	YVO4	8.0	25.4	17.0	400-4000nm
PZ5-Y10	YVO4	10.0	25.4	23.0	

## Wollaston Polarizers

Wollaston polarizers can separate an incident beam into two rays: extraordinary and ordinary ray with a deviation angle which is dependent on wavelength. Both rays are transmitted through the other surface.

- Materials: Calcite,  $\alpha$ -BBO, YVO4
- Extinction ratio:  $10^5 : 1$
- Angle field:  $15^\circ$  (Calcite)
- Dimension tolerance:  $\pm 0.1\text{mm}$
- Surface quality: 20-10 S/D
- Coating on both sides: Single layer  $\text{MgF}_2$  coating



Item#	Material	Clear aperture $\varnothing a$ (mm)	Holder $\varnothing$ (mm)	Length (mm)	Application Wavelength
PZ4-C08	Calcite	8.0	25.4	17.0	350-2300nm
PZ4-C10	Calcite	10.0	25.4	19.0	
PZ4-C15	Calcite	15.0	30.0	23.0	
PZ4-B08	$\alpha$ -BBO	8.0	25.4	17.0	190-3500nm
PZ4-B10	$\alpha$ -BBO	10.0	25.4	19.0	
PZ4-Y08	YVO4	8.0	25.4	17.0	500-4000nm
PZ4-Y10	YVO4	10.0	25.4	19.0	



## BBO

BBO is an outstanding crystal for many applications in nonlinear optics and electro-optics. BBO is a colorless trigonal uniaxial crystal with low hygroscopic susceptibility. Its transparency range is from 0.19 $\mu$ m to 3.5 $\mu$ m.

BBO is an efficient nonlinear crystal for second, third, fourth and fifth harmonic generators of Nd: Laser, dye lasers and ultrafast Ti:Sapphire lasers. It has also excellent performance in optical parametric amplifier, oscillators, etc.

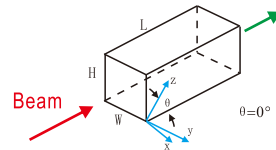
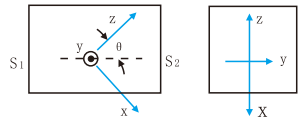
### BBO typical orientations:

- $\theta \neq 0^\circ, \phi = 0^\circ$ , For Type I phase matching application.
- $\theta \neq 0^\circ, \phi = 30^\circ$ , For Type II phase matching application.
- Brewster cut,  $\theta \neq 0^\circ, \phi = 0^\circ$ , or  $30^\circ$ , no coating on S1&S2.
- Z-cut, gold coated on X-faces, for Q-switch application.

Phase matching angle:  $\theta$  and  $\phi$

$\theta$  and  $\phi$  are depended on different applications of frequency conversion.

If you are not sure to calculate the phase matching angles, please contact us for assistance.



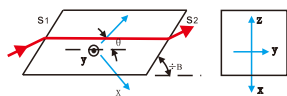
### Typical Sizes

Aperture: 5x5mm, 6x6mm, 7x7mm, 10x10mm  
 Thickness: 0.1mm, 0.2m, 0.5mm, 1.0mm, 2.0mm, 3.0mm, 5.0mm

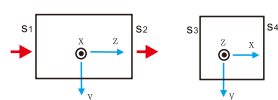
### Coating

Protective coating is required to prevent polished surfaces from fogging.  
 Anti-reflective coating should be considered if low reflectivity is required.

Brewster angle cut



z-cut



Custom Design

Price On request

## Nd:YAG

Nd:YAG (neodymium-doped yttrium aluminium garnet; Nd:Y<sub>3</sub>Al<sub>5</sub>O<sub>12</sub>) is a crystal that is used as a lasing medium for solid-state lasers. The dopant, triply ionized neodymium, typically replaces yttrium in the crystal structure of the yttrium aluminium garnet, since they are of similar size. Generally the crystalline host is doped with around 1% neodymium.

Nd:YAG rod is an excellent laser crystal for high energy application, it has a high thermal conductivity, and good optical quality.

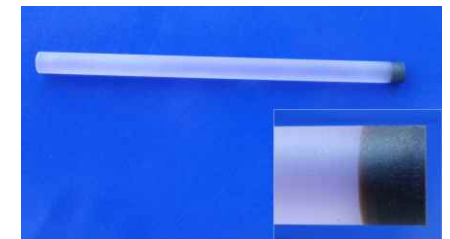
- Nd dopant: 1.1%
- Dimension tolerance:  $\pm 0.1$ mm
- Angle tolerance:  $< 0.5^\circ$
- Surface flatness:  $\lambda/8@632.8$ nm
- Wavefront distortion:  $\lambda/8@632.8$ nm
- Surface quality: 10-5 S/D
- Parallelism:  $< 20$  arcsec
- Perpendicularity:  $< 5$  arcmin
- Clear aperture:  $> 85\%$

AR coating on both faces: R $< 0.15\%$  @1064nm



### Typical sizes of Nd:YAG

Diameter	Length	Nd-dopant
Ø3.0	30, 50, 70, 120	1.1 $\pm$ 0.1%
Ø4.0	50, 80, 120	1.1 $\pm$ 0.1%
Ø5.0	120	1.1 $\pm$ 0.1%
Ø6.0	120, 145,	1.1 $\pm$ 0.1%
Ø7.0	120, 145, 165	1.1 $\pm$ 0.1%
Ø8.0	120, 130, 145, 150	1.1 $\pm$ 0.1%



Compound of Nd:YAG+Cr<sup>3+</sup>:YAG

Custom Design

Price On request

## Nd:YVO4

Nd:YVO4 is an excellent laser crystal for diode laser pumped solid state lasers. It has large stimulated emission cross-section at lasing wavelength, high absorption coefficient and wide absorption bandwidth at pump wavelength. Nd:YVO4 exhibit high laser induced damage threshold. Nd:YVO4 shows its particular advantage over other commonly used laser crystals for compact design.

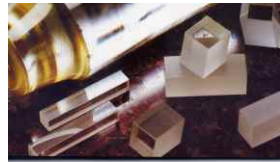
Nd dopant: 0.5--3.0%  
 Dimension tolerance:  $\pm 0.1$ mm  
 Angle tolerance:  $< 0.5^\circ$   
 Surface flatness:  $\lambda/8@632.8$ nm  
 Wavefront distortion:  $\lambda/8@632.8$ nm  
 Surface quality: 10-5 S/D  
 Parallelism:  $< 10$  arcsec  
 Perpendicularity:  $< 5$  arcmin  
 Clear aperture:  $> 85\%$



Coating on both faces: customized.

### Typical sizes of Nd:YVO4

Size	Length	Nd-dopant
3.0x3.0	1, 2, 3, 5	0.5%---3.0%
3.0x3.0	7, 10, 12, 15	0.5%---3.0%
4.0x4.0	8, 10, 15, 20	0.5%---3.0%



Custom Design

Price On request

