

Beamsplitters

- **Laser and Broadband Plate Beamsplitters** (with multilayer dielectric coatings)
- **Non-polarizing Laser Cube Beamsplitters** (with special all-dielectric coatings)
- **Polarizing Cube Beamsplitters** (with dielectric coatings)
- **Broadband Cube Beamsplitters** (with dielectric coatings)
- **Low-polarizing Cube Beamsplitters** (with hybrid coatings)
- **Metallized Plate Beamsplitters** (with inexpensive metallic coatings)
- **Metallized Cube Beamsplitters** (with internal metal film coatings)
- **Beam Samplers** (provide a 4% reflected beam for sampling)
- **Harmonic Separators** (for separating YAG laser harmonics)
- **Pellicle Beamsplitters** (coated for a range of intensity splits)



Beamsplitters are one of the most versatile and useful optical tools available. With them you can separate light into two completely independent beams. Separation can be by either amplitude (intensity) or by wavelength. In either case the two beams retain all of the attributes (such as intensity/wavelength distribution, wavefront shape, and spatial/temporal distributions) that the original beam exhibited.

There are three basic forms of optical beamsplitter: parallel plates, cubes and pellicles. The simplest, the **parallel plate**, consists of a carefully generated transparent substrate with a partially reflective coating on one side and an Anti-Reflection coating on the second surface. These are usually designed to be used at an angle of 45 degrees. By making the second surface at a wedged angle to the first surface any residual ghost image can be made to fall outside of field of view of the following system.

Cube beamsplitters are simply two right angle prisms cemented together with a partially reflecting surface on the internal (protected) face. The beamsplitting film is deposited on the hypotenuse face of a precision BK7 prism whose faces are $\lambda/4$ and the prism is cemented to an identical prism to form a cube which is parallel sided within 5arcmin. The four outer faces are all Anti-Reflection (AR) coated.

Pellicles are essentially single surfaced beamsplitters. In this case one face carries the partially reflecting film and the second, uncoated, surface will produce a roughly 4% ghost image. But the ghost image will be displaced only ~ 2 microns laterally from the primary image and may usually be ignored.

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These laser beamsplitters are of the finest quality and may be used with confidence in the most demanding applications. The coatings have been optimized for the specific laser wavelengths specified and exhibit very little absorption at those wavelengths. If you need a laser beamsplitter at some other laser line (or in some other splitting ratio) please let us know.

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Laser and Broadband Plate Beamsplitters

- Available with highly parallel or wedged faces to reduce ghosts
- Polished both sides to $\lambda/10$
- Coating optimized for low loss
- Available with Ultra-Violet grade fused silica and BK7 substrates
- Standard diameters from 25.4 to 50.8mm

These superior beamsplitters are multilayer dielectric coatings on a BK7 or synthetic fused silica substrate. The beamsplitter substrate is polished on both sides to a flatness of $\lambda/10$. Substrates can be either precisely parallel to 5arcsec or wedged with a 1 degree angle. The wedge angle eliminates ghost images by bending the beam out of the direction of the principal beam.

Note that when used as intended at 45 degrees these beamsplitters present a smaller cross section to the beam. (The 30mm diameter, 3mm thick size presents a 20mm cross section and the 50mm diameter, 5mm thick size presents a 32mm cross section). The coatings provide approximately equal reflected and transmitted beams with very little absorption loss (see reflectivity curves on pages 169-171). However the, p- and s-components are quite different (typically $R_p=35\%$ and $R_s=65\%$). Several different coatings are offered from the Ultra-Violet through the visible to the near IR.



Specifications & Tolerances

Surface flatness: $\lambda/10$	Diameter: +0, -0.2mm
Thickness: $\pm 0.2\text{mm}$	Parallelism: $\leq 5\text{arcsec}$ or 1° wedge
Surface quality: 20-10	Clear aperture: $>90\%$ diameter
Bevel: $0.2\text{mm} \times 45^\circ$ typical	Material: Synthetic fused silica or BK7
Laser damage threshold: Measured for a sample YAG beamsplitter - $>13\text{J}/\text{cm}^2$ for a 10ns pulse @ 1064nm	
Transmission: $R_{av}=50\%$ at laser wavelength	

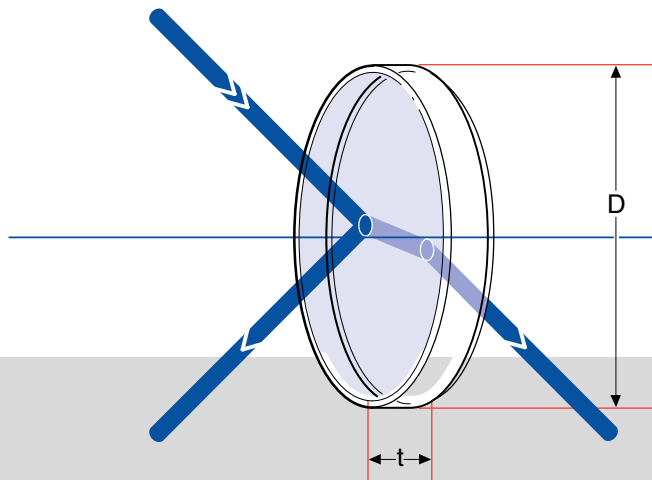
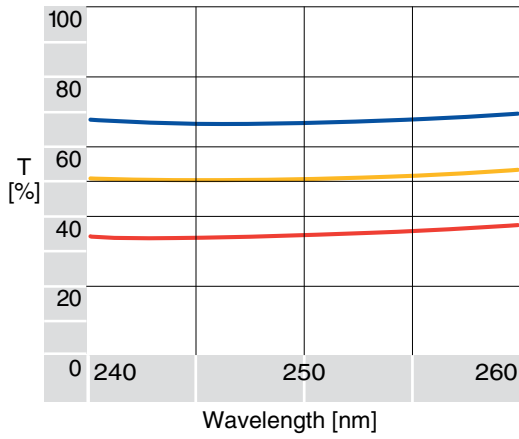
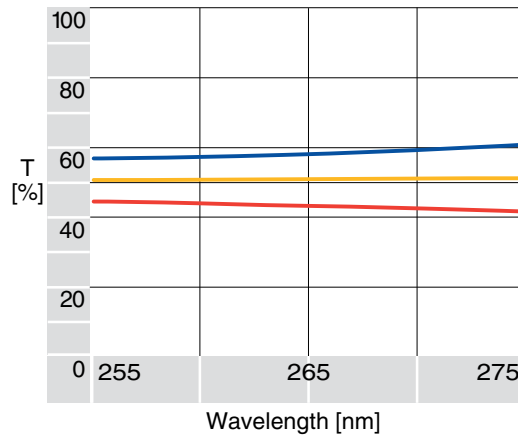


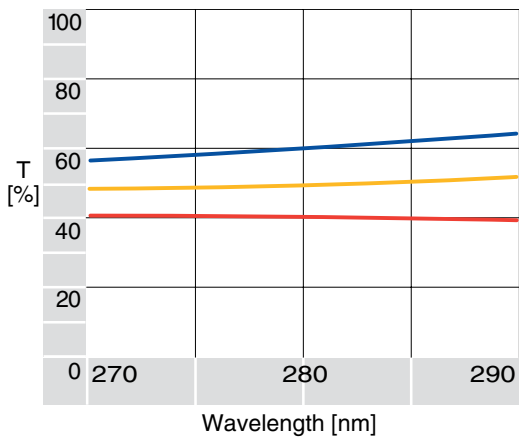
PLATE BEAMSPLITTER



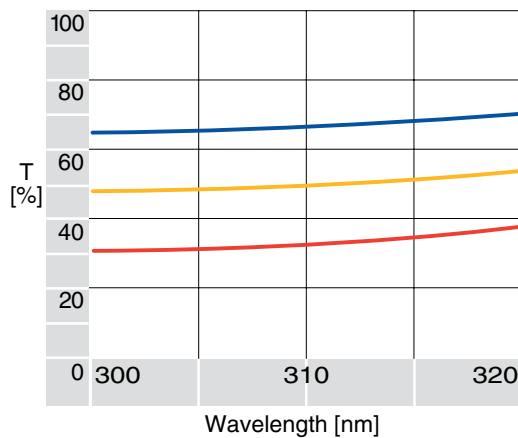
LASER BEAMSPLITTER TRANSMITTANCE
248 nm
P-POL ———
AVG-POL ———
S-POL ———



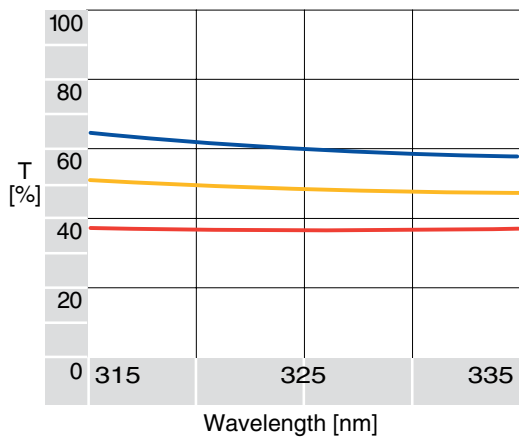
LASER BEAMSPLITTER TRANSMITTANCE
266 nm
P-POL ———
AVG-POL ———
S-POL ———



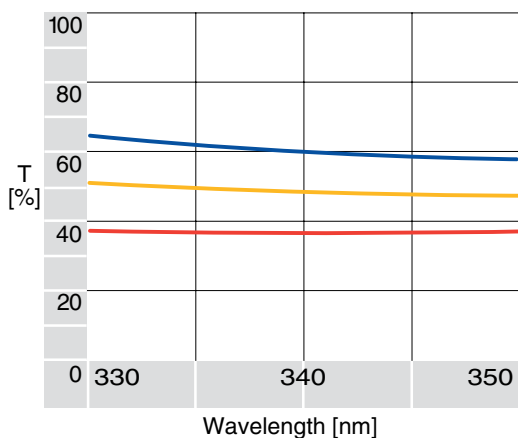
LASER BEAMSPLITTER TRANSMITTANCE
282 nm
P-POL ———
AVG-POL ———
S-POL ———



LASER BEAMSPLITTER TRANSMITTANCE
308 nm
P-POL ———
AVG-POL ———
S-POL ———



LASER BEAMSPLITTER TRANSMITTANCE
325 nm
P-POL ———
AVG-POL ———
S-POL ———



LASER BEAMSPLITTER TRANSMITTANCE
337 nm
P-POL ———
AVG-POL ———
S-POL ———

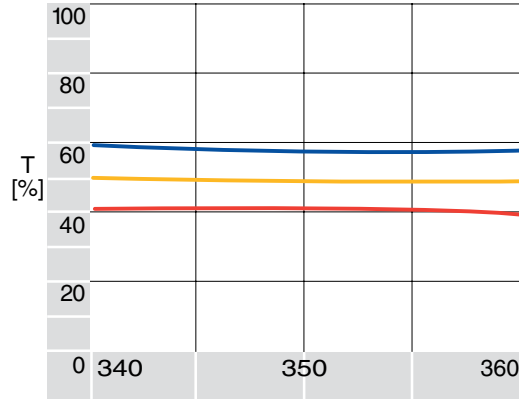
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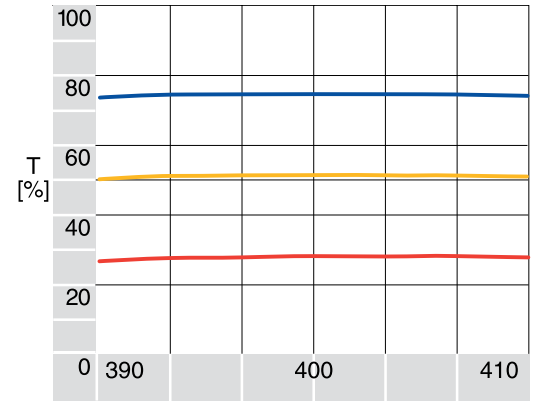
Laser and Broadband Plate Beamsplitters

If you need a beamsplitter quickly, just let us know. Our next-day delivery option costs a little extra, but your system will be up and running that much sooner. And if you don't see the exact beamsplitter that you need give us a call. We have a wide range of special sizes, split ratios, and coatings available.



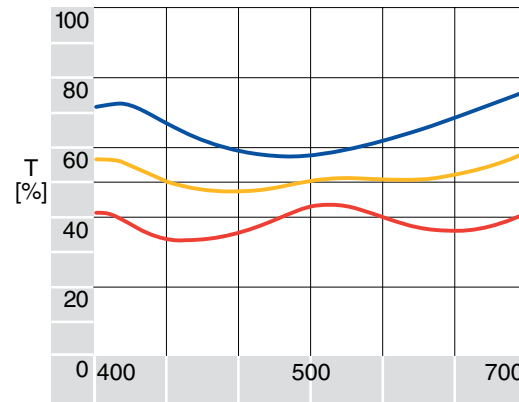
LASER BEAMSPLITTER TRANSMITTANCE
405 nm
352 nm

— P-POL
— AVG-POL
— S-POL



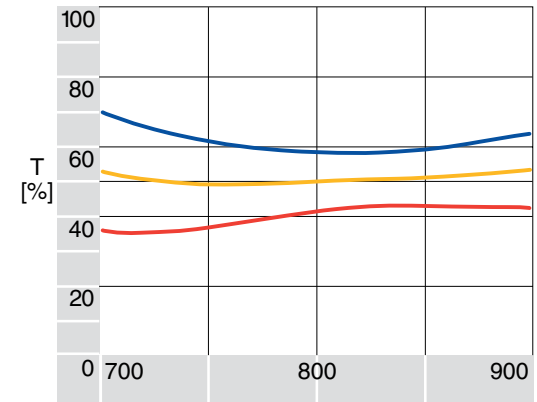
LASER BEAMSPLITTER TRANSMITTANCE
405 nm

— P-POL
— AVG-POL
— S-POL



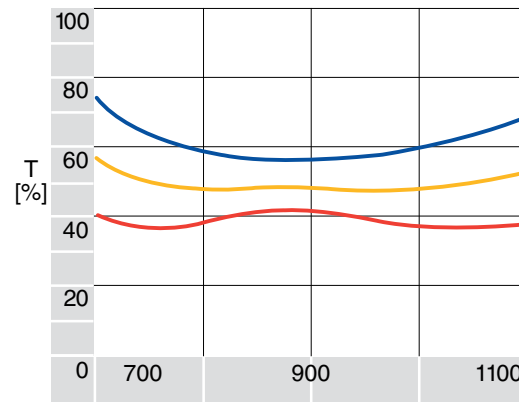
BROADBAND BEAMSPLITTER TRANSMITTANCE
400-700 nm

— P-POL
— AVG-POL
— S-POL



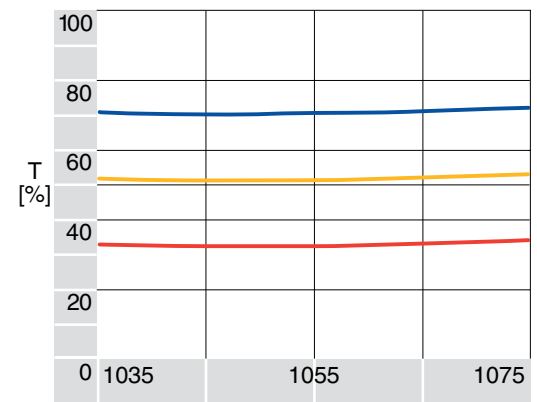
LASER BEAMSPLITTER TRANSMITTANCE
700-900 nm

— P-POL
— AVG-POL
— S-POL



BROADBAND BEAMSPLITTER TRANSMITTANCE
700-1100 nm

— P-POL
— AVG-POL
— S-POL

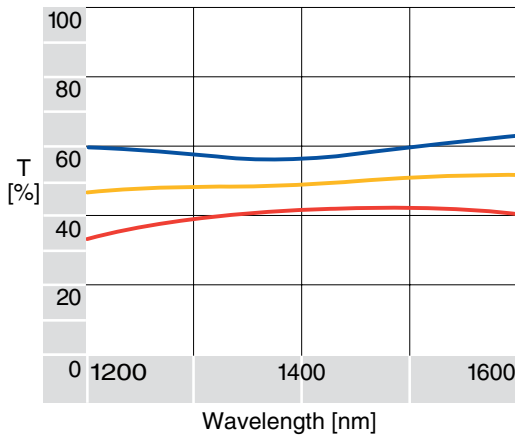


LASER BEAMSPLITTER TRANSMITTANCE
1040-1070 nm

— P-POL
— AVG-POL
— S-POL

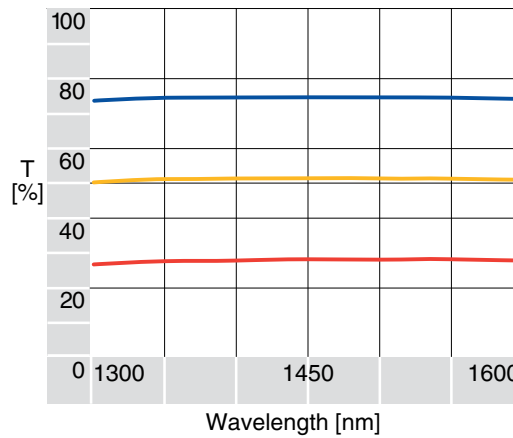
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BROADBAND BEAMSPLITTER TRANSMITTANCE
1200-1600 nm

- P-POL ———
- AVG-POL ———
- S-POL ———



LASER BEAMSPLITTER TRANSMITTANCE
1300-1550 nm

- P-POL ———
- AVG-POL ———
- S-POL ———

Laser & Broadband Plate Beamsplitters

Wavelength Range (nm)	Laser Type	Diameter, D (mm)	Thickness, t (mm)	Substrate	Price	PART NUMBER
248.4	KrF	30.0	3.0	SFS	\$ 242.00	038-1550
248.4	KrF	30.0	5.0	SFS	\$ 267.00	038-1550-W
248.4	KrF	50.0	5.0	SFS	\$ 336.00	038-1560
248.4	KrF	50.0	8.0	SFS	\$361.00	038-1560-W
266	YAG4TH	30.0	3.0	SFS	\$ 242.00	038-1570
266	YAG4TH	30.0	5.0	SFS	\$ 267.00	038-1570-W
266	YAG4TH	50.0	5.0	SFS	\$ 336.00	038-1580
266	YAG4TH	50.0	8.0	SFS	\$ 361.00	038-1580-W
282	XeBr	30.0	3.0	SFS	\$ 242.00	038-1650
282	XeBr	30.0	5.0	SFS	\$ 267.00	038-1650-W
282	XeBr	50.0	5.0	SFS	\$ 336.00	038-1660
282	XeBr	50.0	8.0	SFS	\$ 361.00	038-1660-W
308	XeCl	30.0	3.0	SFS	\$ 242.00	038-1670
308	XeCl	30.0	5.0	SFS	\$ 267.00	038-1670-W
308	XeCl	50.0	5.0	SFS	\$ 336.00	038-1680
308	XeCl	50.0	8.0	SFS	\$ 361.00	038-1680-W
325	HeCd	30.0	3.0	SFS	\$ 242.00	038-1760
325	HeCd	30.0	5.0	SFS	\$ 267.00	038-1760-W
325	HeCd	50.0	5.0	SFS	\$ 336.00	038-1770
325	HeCd	50.0	8.0	SFS	\$ 361.00	038-1770-W
337	N2	30.0	3.0	SFS	\$ 242.00	038-1780
337	N2	30.0	5.0	SFS	\$ 267.00	038-1780-W
337	N2	50.0	5.0	SFS	\$ 336.00	038-1790
337	N2	50.0	8.0	SFS	\$ 361.00	038-1790-W
352	XeF	30.0	3.0	SFS	\$ 242.00	038-1880
352	XeF	30.0	5.0	SFS	\$ 267.00	038-1880-W
352	XeF	50.0	5.0	SFS	\$ 336.00	038-1890
352	XeF	50.0	8.0	SFS	\$ 361.00	038-1890-W
355	NdYag 3rd	30.0	3.0	SFS	\$ 242.00	038-1910
355	NdYag 3rd	30.0	5.0	SFS	\$ 267.00	038-1910-W
355	NdYag 3rd	50.0	5.0	SFS	\$ 336.00	038-1920
355	NdYag 3rd	50.0	8.0	SFS	\$ 361.00	038-1920-W

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Wavelength Range (nm)	Laser Type	Diameter, D (mm)	Thickness, t (mm)	Substrate	Price	PART NUMBER
390-410	LD	30.0	3.0	BK7	\$ 168.00	038-1950
390-410	LD	30.0	5.0	BK7	\$ 193.00	038-1950-W
390-410	LD	50.0	5.0	BK7	\$ 248.00	038-1960
390-410	LD	50.0	8.0	BK7	\$ 273.00	038-1960-W
400-700	Broadband	25.4	3.0	BK7	\$ 126.00	038-0560
400-700	Broadband	25.4	5.0	BK7	\$ 151.00	038-0560-W
400-700	Broadband	30.0	3.0	BK7	\$ 158.00	038-0570
400-700	Broadband	30.0	5.0	BK7	\$ 183.00	038-0570-W
400-700	Broadband	50.0	5.0	BK7	\$ 247.00	038-0580
400-700	Broadband	50.0	8.0	BK7	\$ 272.00	038-0580-W
400-700	Broadband	50.8	5.0	BK7	\$ 247.00	038-0590
400-700	Broadband	50.8	8.0	BK7	\$ 272.00	038-0590-W
700-900	Diode	30.0	3.0	BK7	\$ 158.00	038-0770
700-900	Diode	30.0	5.0	BK7	\$ 183.00	038-0770-W
700-900	Diode	50.0	5.0	BK7	\$ 247.00	038-0780
700-900	Diode	50.0	8.0	BK7	\$ 272.00	038-0780-W
1064	YAG	25.4	3.0	BK7	\$ 168.00	038-0970
1064	YAG	25.4	5.0	BK7	\$ 193.00	038-0970-W
1064	YAG	30.0	3.0	BK7	\$ 200.00	038-0990
1064	YAG	30.0	5.0	BK7	\$ 225.00	038-0990-W
1064	YAG	50.0	5.0	BK7	\$ 305.00	038-1110
1064	YAG	50.0	8.0	BK7	\$ 330.00	038-1110-W
1064	YAG	50.8	5.0	BK7	\$ 310.00	038-1115
1064	YAG	50.8	8.0	BK7	\$ 335.00	038-1115-W
1200-1600	Broadband	25.4	3.0	BK7	\$ 126.00	038-1120
1200-1600	Broadband	25.4	5.0	BK7	\$ 151.00	038-1120-W
1200-1600	Broadband	30.0	3.0	BK7	\$ 158.00	038-1123
1200-1600	Broadband	30.0	5.0	BK7	\$ 183.00	038-1123-W
1200-1600	Broadband	50.0	5.0	BK7	\$ 242.00	038-1125
1200-1600	Broadband	50.0	8.0	BK7	\$ 267.00	038-1125-W
1200-1600	Broadband	50.8	5.0	BK7	\$ 242.00	038-1130
1200-1600	Broadband	50.8	8.0	BK7	\$ 267.00	038-1130-W
1300-1550	Diode	30.0	3.0	BK7	\$ 200.00	038-1150
1300-1550	Diode	30.0	5.0	BK7	\$ 225.00	038-1150-W
1300-1550	Diode	50.0	5.0	BK7	\$ 273.00	038-1160
1300-1550	Diode	50.0	8.0	BK7	\$ 298.00	038-1160-W

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Non-polarizing Laser Cube Beamsplitters

- All-dielectric coatings optimized to be insensitive to polarization at design wavelengths
- BK7 cube material - polished to $\lambda/4$
- Available in a range of laser wavelengths
- Highest performance - negligible absorption
- 5mm beamsplitter cubes available for fiber optic applications
- Standard cubes from 5 to 20mm

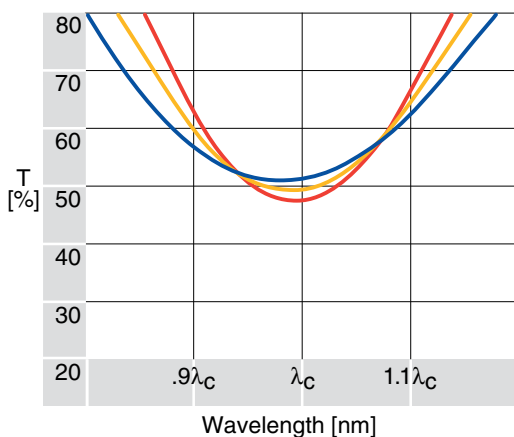


The all-dielectric coatings for these cube beamsplitters are largely insensitive to the polarization state of the incoming beam. The coatings have been designed to hold both the s- and p-polarization components to the same ratio of reflection-to-transmission over a specific laser wavelength region. The graph shows a typical reflectivity curve for the 633nm wavelength. At all the design wavelengths the s-reflectance equals the p-reflectance within $\pm 3\%$, while both the reflectance and the transmittance equal 50% within $\pm 5\%$.

Non-polarizing beamsplitters are available for other wavelength regions. Please call.

These beamsplitters are made from optical grade BK7. The faces are all polished flat to $\lambda/4$ and two like prisms are cemented to form a cube. Both pairs of sides are parallel to within 5arcmin. The four outer faces are all Anti-Reflection coated.

Four standard sizes are offered: 5,10,15 and 20mm. Larger sizes are available on request.



NON-POLARIZING BEAMSPLITTER COATING

P-POL ————
 AVG-POL ————
 S-POL ————

Specifications & Tolerances

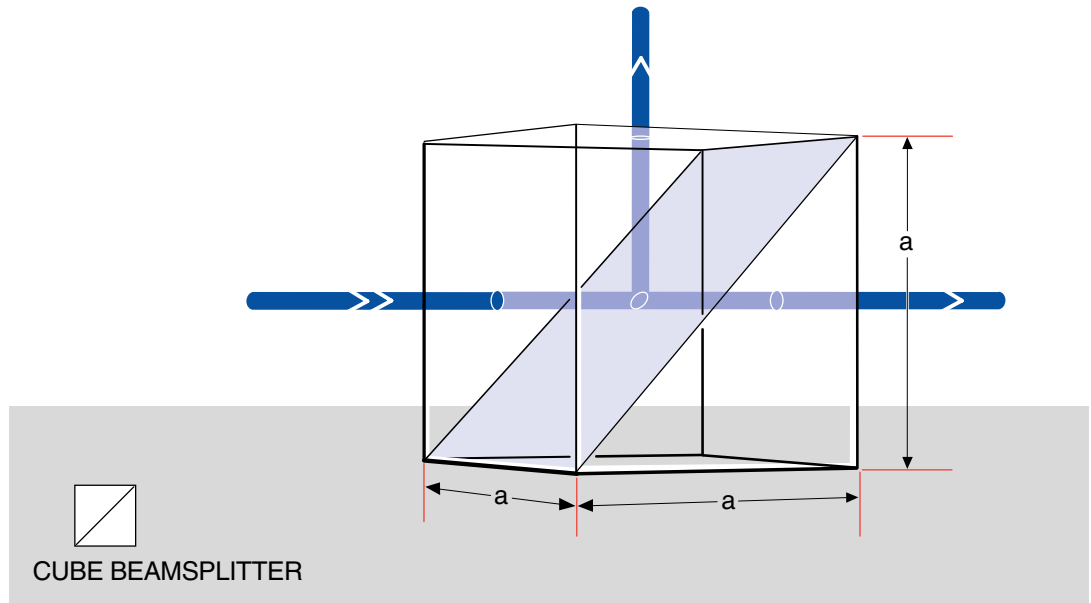
$R_s = R_p \pm 3\%$
 $R_{av} = T_{av} = 50\% \pm 5\%$
 Surface flatness: $\lambda/4$
 Surface quality: 40-20
 Dimensions: $\pm 0.2\text{mm}$
 Beam deviation: $\leq 10\text{arcmin}$
 Material: BK7, grade A
 Damage Threshold: $< 100\text{mJ/cm}^2 @ 10\text{ns}$ pulse

In general, polarization changes in an optical beam whenever a non-normal reflection occurs. In classical optics this usually was of little concern, but laser beams are often quite sensitive to the exact state of polarization of the beam.

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- Prisms
- Substrates & Windows
- Beamsplitters**
- Polarizers
- Filter & Apertures



Non-polarizing Laser Cube Beamsplitters

Wavelength Range (nm)	Cube Side, a (mm)	Material	Surface Flatness	Transmission (P/S %)	Price	PART NUMBER
266	10	SFS	$\lambda/4$	50 ± 10	\$ 395.00	039-1000
266	15	SFS	$\lambda/4$	50 ± 10	\$ 415.00	039-1005
266	20	SFS	$\lambda/4$	50 ± 10	\$ 435.00	039-1010
355	10	SFS	$\lambda/4$	50 ± 7	\$ 395.00	039-1015
355	15	SFS	$\lambda/4$	50 ± 7	\$ 415.00	039-1020
355	20	SFS	$\lambda/4$	50 ± 7	\$ 435.00	039-1025
405	10	BK7	$\lambda/4$	50 ± 7	\$ 184.00	039-1030
405	15	BK7	$\lambda/4$	50 ± 7	\$ 200.00	039-1035
405	20	BK7	$\lambda/4$	50 ± 7	\$ 242.00	039-1040
488	10	BK7	$\lambda/4$	50 ± 5	\$ 184.00	039-1045
488	15	BK7	$\lambda/4$	50 ± 5	\$ 200.00	039-1050
488	20	BK7	$\lambda/4$	50 ± 5	\$ 242.00	039-1055
514.5	10	BK7	$\lambda/4$	50 ± 5	\$ 184.00	039-1060
514.5	15	BK7	$\lambda/4$	50 ± 5	\$ 200.00	039-1065
514.5	20.0	BK7	$\lambda/4$	50 ± 5	\$ 242.00	039-1070
532	10.0	BK7	$\lambda/4$	50 ± 5	\$ 184.00	039-1075
532	15.0	BK7	$\lambda/4$	50 ± 5	\$ 200.00	039-1080
532	20.0	BK7	$\lambda/4$	50 ± 5	\$ 242.00	039-1085
632.8	5.0	BK7	$\lambda/4$	50 ± 5	\$ 184.00	039-1105
632.8	10.0	BK7	$\lambda/4$	50 ± 5	\$ 200.00	039-1110
632.8	15.0	BK7	$\lambda/4$	50 ± 5	\$ 242.00	039-1120
632.8	20.0	BK7	$\lambda/4$	50 ± 5	\$ 268.00	039-1130
670	10.0	BK7	$\lambda/4$	50 ± 5	\$ 200.00	039-1140
670	15.0	BK7	$\lambda/4$	50 ± 5	\$ 242.00	039-1150
670	20.0	BK7	$\lambda/4$	50 ± 5	\$ 268.00	039-1160
780	10.0	BK7	$\lambda/4$	50 ± 5	\$ 200.00	039-1170
780	15.0	BK7	$\lambda/4$	50 ± 5	\$ 242.00	039-1180
780	20.0	BK7	$\lambda/4$	50 ± 5	\$ 268.00	039-1190

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Non-polarizing Laser Cube Beamsplitters (continued)

Wavelength Range (nm)	Cube Side, a (mm)	Material	Surface Flatness	Transmission (P/S %)	Price	PART NUMBER
830	10.0	BK7	$\lambda/4$	50 \pm 5	\$ 200.00	039-1220
830	15.0	BK7	$\lambda/4$	50 \pm 5	\$ 242.00	039-1230
830	20.0	BK7	$\lambda/4$	50 \pm 5	\$ 268.00	039-1240
1064	10.0	BK7	$\lambda/4$	50 \pm 5	\$ 221.00	039-1350
1064	15.0	BK7	$\lambda/4$	50 \pm 5	\$ 284.00	039-1355
1064	20.0	BK7	$\lambda/4$	50 \pm 5	\$ 315.00	039-1360
1300	10.0	BK7	$\lambda/4$	50 \pm 5	\$ 221.00	039-1250
1300	15.0	BK7	$\lambda/4$	50 \pm 5	\$ 284.00	039-1260
1300	20.0	BK7	$\lambda/4$	50 \pm 5	\$315.00	039-1270
1550	10.0	BK7	$\lambda/4$	50 \pm 5	\$ 221.00	039-1280
1550	15.0	BK7	$\lambda/4$	50 \pm 5	\$ 284.00	039-1290
1550	20.0	BK7	$\lambda/4$	50 \pm 5	\$ 315.00	039-1330

Larger non-polarizing cube beamsplitters are available on request.

The Non-polarizing Beamsplitters described here should be used in any situation where a change in the polarization state of the beam will have an undesired or unpredictable result. Please call if you need larger sizes or optimization at other wavelengths.



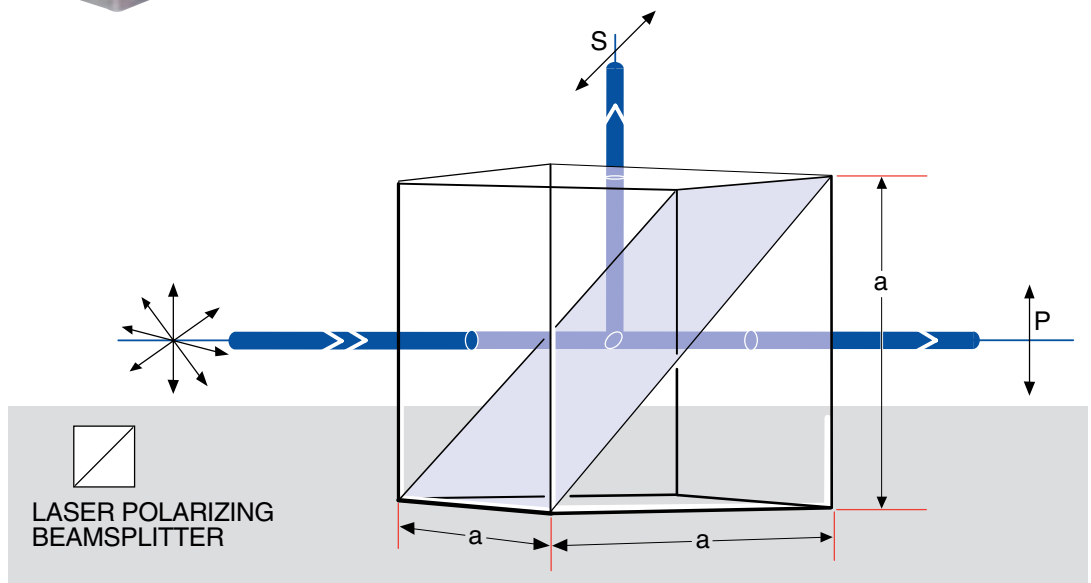
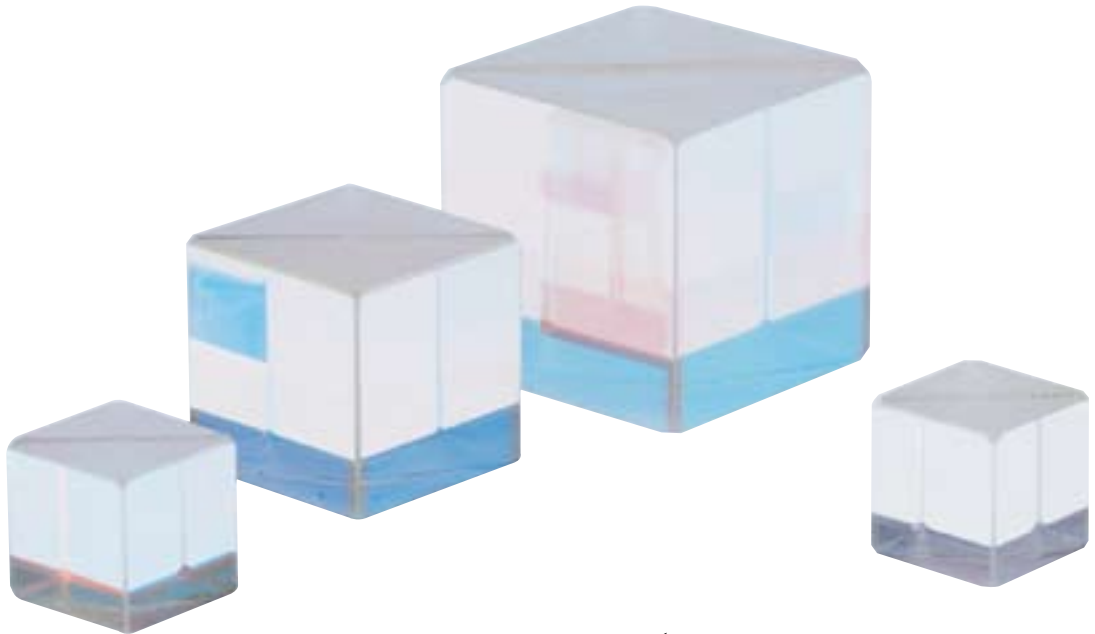
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Laser Polarizing Cube Beamsplitters

- Thin film polarizers optimized for use at popular laser wavelengths
- Transmitted extinction ratio of better than 2.5×10^{-3}
- Reflected extinction ratio of better than 2×10^{-2}
- Polarizing film mounted on the internal face of a cube beamsplitter
- Multilayer high efficiency narrowband Anti-Reflection coatings on all faces

These are thin film polarizers constructed as a cube. Thin film polarizers utilize the polarization which occurs on reflection from a plane surface. By combining a large number of such surfaces in a stack it is possible to obtain useful extinction ratios. The s-polarization is more than 99% reflected while the p-polarization can be suppressed in the reflected beam and become 95% transmitted. Thin film polarizers can be optimized for a particular wavelength to give superior performance for laser applications.



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Specifications & Tolerances

Dimensions: $\pm 0.2\text{mm}$

Surface flatness: $\lambda/4$

Beam deviation: $\leq 10\text{arcmin}$

Asymmetry: 1°

Surface quality: 40-20

Material: BK7

Coating: Narrowband multilayer

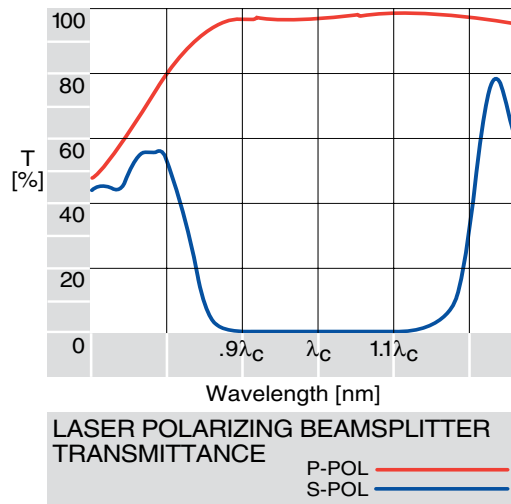
Anti-Reflection on faces

Extinction ratio: $T_s < 2.5 \times 10^{-3}, < 5 \times 10^{-3}$

@1064 nm $R_p < 2 \times 10^{-2}$

Damage threshold: $< 100\text{mJ/cm}^2$ in 10ns

@1064nm



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Laser Polarizing Cube Beamsplitters (continued)

Wavelength Range (nm)	Laser Type	Cube Side, a (mm)	Material	Surface Flatness	Price	PART NUMBER
405	LD	10.0	BK7	$\lambda/4$	\$ 194.00	067-0100
405	LD	15.0	BK7	$\lambda/4$	\$ 221.00	067-0105
405	LD	20.0	BK7	$\lambda/4$	\$ 231.00	067-0110
441.6	HeCd	10.0	BK7	$\lambda/4$	\$ 194.00	067-0120
441.6	HeCd	15.0	BK7	$\lambda/4$	\$ 221.00	067-0130
441.6	HeCd	20.0	BK7	$\lambda/4$	\$ 231.00	067-0140
458	HeCd	10.0	BK7	$\lambda/4$	\$ 194.00	067-0170
458	HeCd	15.0	BK7	$\lambda/4$	\$ 221.00	067-0180
458	HeCd	20.0	BK7	$\lambda/4$	\$ 231.00	067-0190
488	Ar Ion	10.0	BK7	$\lambda/4$	\$ 194.00	067-0230
488	Ar Ion	15.0	BK7	$\lambda/4$	\$ 221.00	067-0240
488	Ar Ion	20.0	BK7	$\lambda/4$	\$ 231.00	067-0250
514.5	Ar Ion	10.0	BK7	$\lambda/4$	\$ 194.00	067-0280
514.5	Ar Ion	15.0	BK7	$\lambda/4$	\$ 221.00	067-0290
514.5	Ar Ion	20.0	BK7	$\lambda/4$	\$ 231.00	067-0330
532	YAG 2nd	10.0	BK7	$\lambda/4$	\$ 194.00	067-0360
532	YAG 2nd	12.7	BK7	$\lambda/4$	\$ 205.00	067-0365
532	YAG 2nd	15.0	BK7	$\lambda/4$	\$ 221.00	067-0370
532	YAG 2nd	20.0	BK7	$\lambda/4$	\$ 231.00	067-0380
632.8	HeNe	5.0	BK7	$\lambda/4$	\$ 184.00	067-0440
632.8	HeNe	10.0	BK7	$\lambda/4$	\$ 194.00	067-0450
632.8	HeNe	12.7	BK7	$\lambda/4$	\$ 205.00	067-0455
632.8	HeNe	15.0	BK7	$\lambda/4$	\$ 221.00	067-0460
632.8	HeNe	20.0	BK7	$\lambda/4$	\$ 231.00	067-0470
670	Diode	5.0	BK7	$\lambda/4$	\$ 184.00	067-0490
670	Diode	10.0	BK7	$\lambda/4$	\$ 194.00	067-0492
670	Diode	12.7	BK7	$\lambda/4$	\$ 205.00	067-0493
670	Diode	15.0	BK7	$\lambda/4$	\$ 221.00	067-0494
670	Diode	20.0	BK7	$\lambda/4$	\$ 231.00	067-0496
780	Diode	5.0	BK7	$\lambda/4$	\$ 184.00	067-0550
780	Diode	10.0	BK7	$\lambda/4$	\$ 194.00	067-0560

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Laser Polarizing Cube Beamsplitters (continued)

Wavelength Range (nm)	Laser Type	Cube Side, a (mm)	Material	Surface Flatness	Price	PART NUMBER
780	Diode	12.7	BK7	$\lambda/4$	\$ 205.00	067-0565
780	Diode	15.0	BK7	$\lambda/4$	\$ 221.00	067-0570
780	Diode	20.0	BK7	$\lambda/4$	\$ 231.00	067-0580
830	Diode	5.0	BK7	$\lambda/4$	\$ 184.00	067-0670
830	Diode	10.0	BK7	$\lambda/4$	\$ 194.00	067-0680
830	Diode	12.7	BK7	$\lambda/4$	\$ 205.00	067-0685
830	Diode	15.0	BK7	$\lambda/4$	\$ 221.00	067-0690
830	Diode	20.0	BK7	$\lambda/4$	\$ 231.00	067-0770
1064	YAG	10.0	BK7	$\lambda/4$	\$ 231.00	067-1030
1064	YAG	15.0	BK7	$\lambda/4$	\$ 231.00	067-1050
1064	YAG	20.0	BK7	$\lambda/4$	\$ 231.00	067-1060
1300	Diode	5.0	BK7	$\lambda/4$	\$ 184.00	067-1130
1300	Diode	10.0	BK7	$\lambda/4$	\$ 194.00	067-1140
1300	Diode	12.7	BK7	$\lambda/4$	\$ 205.00	067-1145
1300	Diode	15.0	BK7	$\lambda/4$	\$ 221.00	067-1150
1300	Diode	20.0	BK7	$\lambda/4$	\$ 231.00	067-1160
1321-1343	Diode	5.0	BK7	$\lambda/4$	\$ 184.00	067-1170
1321-1343	Diode	10.0	BK7	$\lambda/4$	\$ 194.00	067-1172
1321-1343	Diode	12.7	BK7	$\lambda/4$	\$ 205.00	067-1173
1321-1343	Diode	15.0	BK7	$\lambda/4$	\$ 221.00	067-1174
1321-1343	Diode	20.0	BK7	$\lambda/4$	\$ 231.00	067-1176
1550	Diode	5.0	BK7	$\lambda/4$	\$ 184.00	067-1190
1550	Diode	10.0	BK7	$\lambda/4$	\$ 194.00	067-1220
1550	Diode	12.7	BK7	$\lambda/4$	\$ 205.00	067-1225
1550	Diode	15.0	BK7	$\lambda/4$	\$ 221.00	067-1230
1550	Diode	20.0	BK7	$\lambda/4$	\$ 231.00	067-1240

Please call if you need polarizing beamsplitters for other wavelengths, other sizes, or other configurations. We believe that you will be pleased by our competitive prices for volume requirements.

Polarizing beamsplitters for other sizes and wavelengths can be produced to special order. Please call.

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High Power Laser Polarizing Cube Beamsplitters

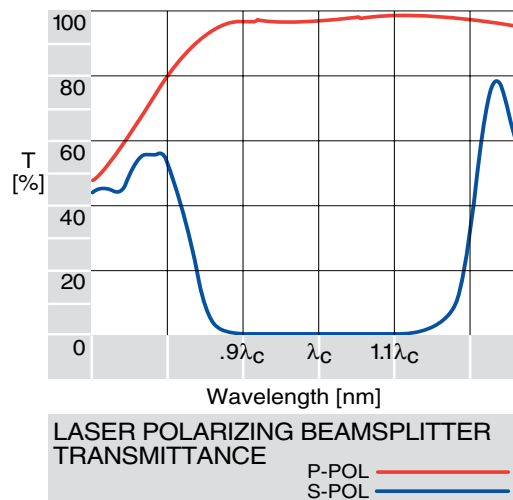
- Thin film polarizers optimized for use at popular laser wavelengths
- Transmittance p-polarization $\leq 97\%$
- High Power Polarizing Cube Beamsplitters have greater durability than standard laser polarizing cube beamsplitters
- Multilayer high efficiency narrowband Anti-Reflection coatings on all faces



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Beamsplitters
Polarizers
Filter & Apertures

Specifications & Tolerances

Dimensions: $\pm 0.2\text{mm}$
 Surface flatness: $\lambda/4$
 Beam deviation: $\leq 10\text{arcmin}$
 Asymmetry: 1°
 Surface quality: 40-20
 Material: BK7, SFS
 Coating: Narrowband multilayer
 Anti-Reflection on faces
 Extinction ratio: $T_s / (T_s + R_s) = 1/400$
 Transmittance of p-polarization $\geq 97\%$
 Damage threshold: 355nm 2J/cm²
 1064nm 7J/cm²



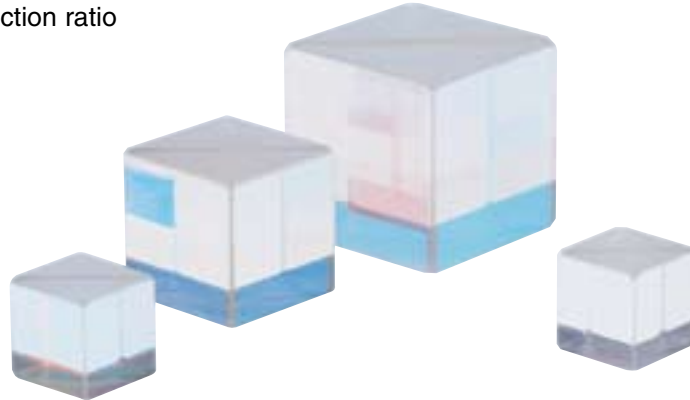
High Power Laser Polarizing Cube Beamsplitters

Wavelength Range (nm)	Cube Side, a (mm)	Material	Surface Flatness	Price	PART NUMBER
355	10.0	SFS	$\lambda/4$	\$ 500.00	067-3100
355	15.0	SFS	$\lambda/4$	\$ 550.00	067-3110
355	20.0	SFS	$\lambda/4$	\$ 725.00	067-3120
532	10.0	BK7	$\lambda/4$	\$ 450.00	067-3130
532	15.0	BK7	$\lambda/4$	\$ 500.00	067-3140
532	20.0	BK7	$\lambda/4$	\$ 650.00	067-3150
1064	10.0	BK7	$\lambda/4$	\$ 450.00	067-3160
1064	15.0	BK7	$\lambda/4$	\$ 500.00	067-3170
1064	20.0	BK7	$\lambda/4$	\$ 650.00	067-3180

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Broadband Polarizing Cube Beamsplitters

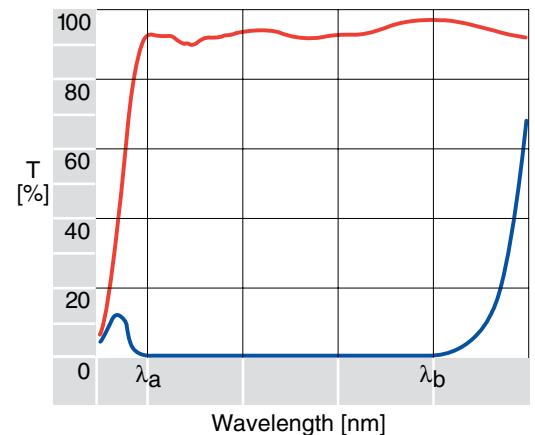
- Thin film polarizers for broadband use
- Three convenient wavebands cover most applications
- Laser quality and performance
- 100:1 Extinction ratio



These thin film cube beamsplitters combine the excellent characteristics of the laser polarizing beamsplitters previously described with the advantage of broadband application. The polarizing film is fully protected within the cube making them durable and convenient to use. Three wavebands have been chosen to cover most general applications: 450-680 covers the visible spectrum and a wide selection of laser wavelengths, 650-850 covers most visible range diode lasers and 1300-1600 covers most telecommunications band diode lasers. Although these polarizers will work well over the entire broadband specified they are manufactured to laser performance standards.

Specifications & Tolerances

Dimensions: $\pm 0.2\text{mm}$
 Surface flatness: $\lambda/4$
 Beam deviation: $\leq 10\text{arcmin}$
 Surface quality: 40-20
 Material: BK7
 Coating: Broadband multilayer
 Anti-Reflection on faces
 Extinction ratio: 100:1

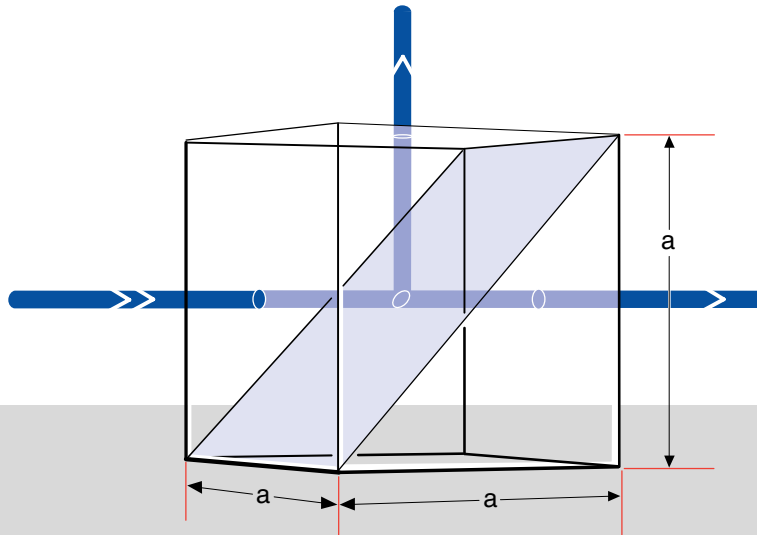


BROADBAND POLARIZING BEAMSPLITTER TRANSMITTANCE
 P-POL ————
 S-POL ————



If you need one of our beamsplitters as soon as possible - just ask for next-day delivery. We try very hard to keep all of our precision beamsplitters in stock for immediate shipment. So you won't find yourself caught trying to finish a project without the correct product.

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Broadband Polarizing Cube Beamsplitters

Wavelength Range (nm)	Side, a (mm)	Price	PART NUMBER
450-680	10.0	\$ 242.00	067-2220
450-680	15.0	\$ 250.00	067-2230
450-680	20.0	\$ 257.00	067-2240
650-850	10.0	\$ 242.00	067-2270
650-850	15.0	\$ 250.00	067-2280
650-850	20.0	\$ 257.00	067-2290
1300-1600	10.0	\$ 242.00	067-2350
1300-1600	15.0	\$ 250.00	067-2360
1300-1600	20.0	\$ 257.00	067-2370



Our beamsplitter cube assembly takes place in a clean room environment to ensure high quality.

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These beamsplitters are suited to a wide variety of general, high performance beamsplitting applications. The sizes listed are standard and we keep most configurations and wavelength regions in stock at all times for immediate delivery. If you need even faster service, ask about our next-day delivery option.

Broadband Cube Beamsplitters

- Four wide wavelength regions for complete coverage of visible and near-IR
- Cube faces AR coated to prevent ghosts
- Standard cubes from 5 to 30mm
- All coatings are multilayer dielectric
- 5mm beamsplitter cubes available for fiber optic applications



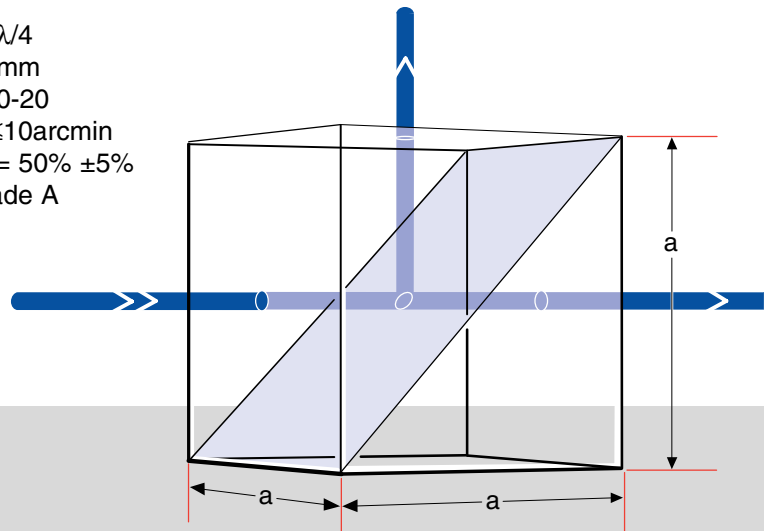
These superior broadband beamsplitters use multilayer dielectric films to produce approximately equal reflectance and transmittance over a broad range of wavelengths. Three different wavelength ranges are offered covering the visible and near infra-red spectrum, as shown on the opposite page.

The beamsplitting film is deposited on the hypotenuse face of a precision BK7 prism whose faces are $\lambda/4$ and the prism is cemented to an identical prism to form a cube which is parallel sided within 5arcmin. The four outer faces are all Anti-Reflection (AR) coated.

Four sizes are offered including a very small 5mm cube which is ideal for fiber optic applications and other uses in which small configurations are required. Standard sizes are 5,10,15 and 20mm. Larger sizes are available on request.

Specifications & Tolerances

Surface flatness: $\lambda/4$
 Dimensions: $\pm 0.2\text{mm}$
 Surface quality: 40-20
 Beam deviation: $\leq 10\text{arcmin}$
 Reflectance: $R_{av} = 50\% \pm 5\%$
 Material: BK7, grade A



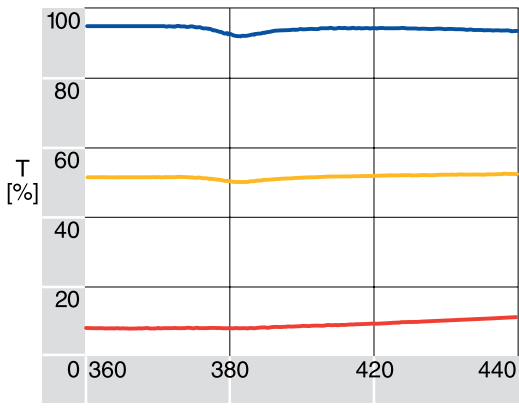
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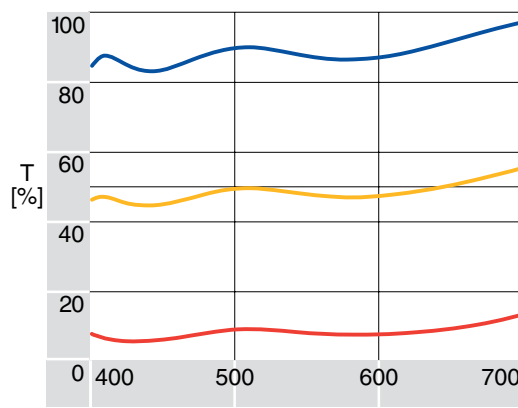
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- Cylindrical Lenses
- Lens Kits
- Achromatic Doublets
- Multi-Element
- Micro Optics
- Mirrors
- Prisms
- Substrates & Windows

Beamsplitters

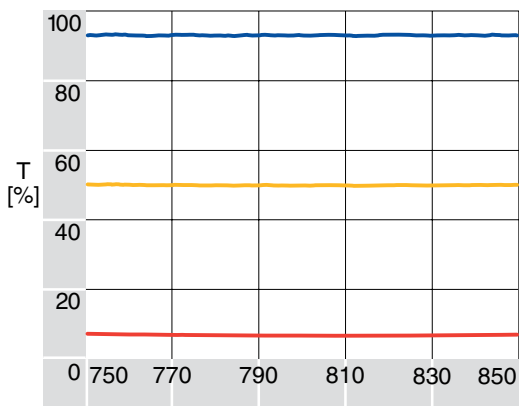
- Polarizers
- Filter & Apertures



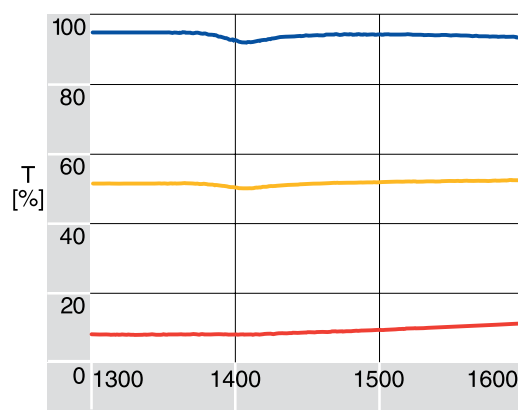
BROADBAND BEAMSPLITTER TRANSMITTANCE
390-410nm
P-POL ———
AVG-POL ———
S-POL ———



BROADBAND BEAMSPLITTER TRANSMITTANCE
400-700 nm
P-POL ———
AVG-POL ———
S-POL ———



BROADBAND BEAMSPLITTER TRANSMITTANCE
750-850 nm
P-POL ———
AVG-POL ———
S-POL ———



BROADBAND BEAMSPLITTER TRANSMITTANCE
1300-1550nm
P-POL ———
AVG-POL ———
S-POL ———

If you don't see exactly the beamsplitter that you need, please ask. Larger sizes, different split ratios and other configurations are available at competitive prices. OEM requirements are welcomed.



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Beamsplitters

Polarizers

Filter & Apertures

Broadband Cube Beamsplitters

Wavelength Range (nm)	Cube Side, a (mm)	Material	Surface Flatness	Price	PART NUMBER
390-410	10.0	BK7	$\lambda/4$	\$ 184.00	039-0290
390-410	15.0	BK7	$\lambda/4$	\$ 194.00	039-0295
390-410	20.0	BK7	$\lambda/4$	\$ 210.00	039-0300
390-410	25.0	BK7	$\lambda/4$	\$ 252.00	039-0305
390-410	30.0	BK7	$\lambda/4$	\$ 320.00	039-0310
400-700	5.0	BK7	$\lambda/4$	\$ 173.00	039-0320
400-700	7.0	BK7	$\lambda/4$	\$ 180.00	039-0325
400-700	10.0	BK7	$\lambda/4$	\$ 184.00	039-0330
400-700	15.0	BK7	$\lambda/4$	\$ 194.00	039-0340
400-700	20.0	BK7	$\lambda/4$	\$ 210.00	039-0350
400-700	25.0	BK7	$\lambda/4$	\$ 252.00	039-0360
400-700	30.0	BK7	$\lambda/4$	\$ 320.00	039-0370
400-700	40.0	BK7	$\lambda/4$	\$ 425.00	039-0375
400-700	50.0	BK7	$\lambda/4$	\$ 595.00	039-0380
750-850	5.0	BK7	$\lambda/4$	\$ 110.00	039-0490
750-850	7.0	BK7	$\lambda/4$	\$ 180.00	039-0495
750-850	10.0	BK7	$\lambda/4$	\$ 116.00	039-0550
750-850	15.0	BK7	$\lambda/4$	\$ 126.00	039-0560
750-850	20.0	BK7	$\lambda/4$	\$ 137.00	039-0570
750-850	25.0	BK7	$\lambda/4$	\$ 163.00	039-0580
750-850	30.0	BK7	$\lambda/4$	\$ 252.00	039-0590
1300-1550	10.0	BK7	$\lambda/4$	\$ 116.00	039-0670
1300-1550	20.0	BK7	$\lambda/4$	\$ 137.00	039-0690



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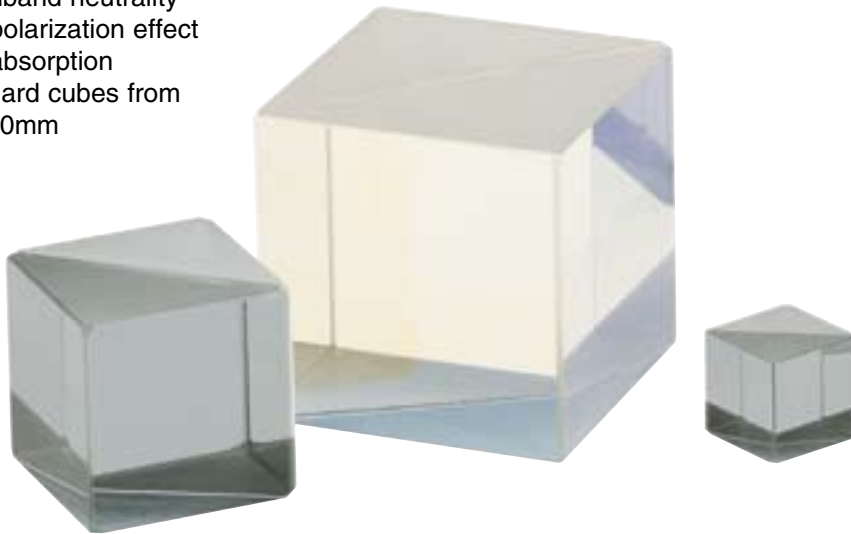
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Low-polarizing Cube Beamsplitters

- Metal-dielectric hybrid coatings
- Broadband neutrality
- Low polarization effect
- Low absorption
- Standard cubes from 5 to 20mm



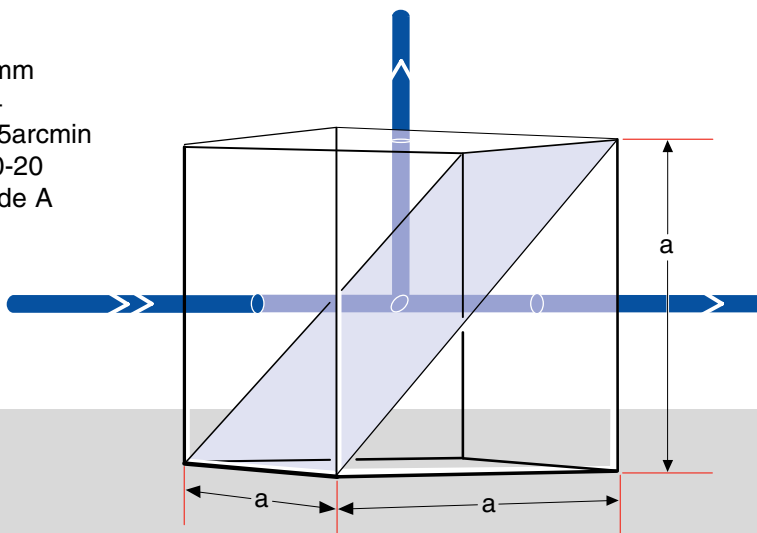
These popular cube beamsplitters use a special combination of metallic and dielectric coatings on the internal splitting face to produce an even split in intensity with minimal polarization and minimal absorption. They make excellent beamsplitters for all but the most demanding applications. Beamsplitting is almost neutral over a broad range of wavelengths. Four wavelength ranges are offered. Two are broadband (400-700 & 600-900) and two are ultra-broadband (400-1000 & 800-1600). The reflected and transmitted beams each contain about 45% of the incoming intensity with only 10% absorbed. Also the s- and p- polarization components are within $\pm 10\%$.

These beamsplitters are made from optical grade BK7. The faces are polished flat to $\lambda/4$ and two like prisms are cemented together to form a cube. Both pairs of sides are parallel to within 5arcmin. The four outer faces are broadband Anti-Reflection coated.

Four standard sizes are offered: 5,10,15 and 20mm. Larger sizes are available on request.

Specifications & Tolerances

R=T: $45\% \pm 10\%$
 Dimensions: $\pm 0.2\text{mm}$
 Prism flatness: $\lambda/4$
 Beam deviation: $\leq 5\text{arcmin}$
 Surface quality: 40-20
 Material: BK7, grade A
 $R_s - R_p < 10\%$



CUBE BEAMSPLITTER

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Achromatic Doublets

Multi-Element

Micro Optics

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Prisms

Substrates & Windows

Beamsplitters

Polarizers

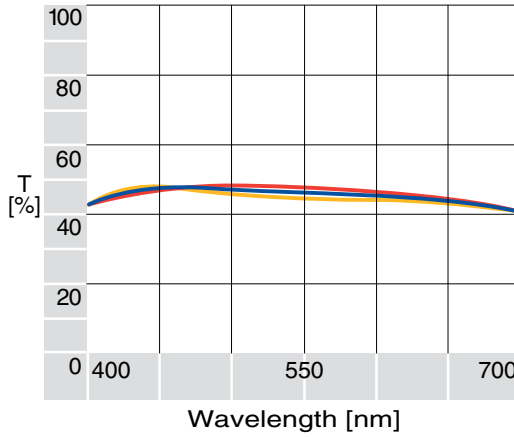
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OPTICAL COMPONENTS

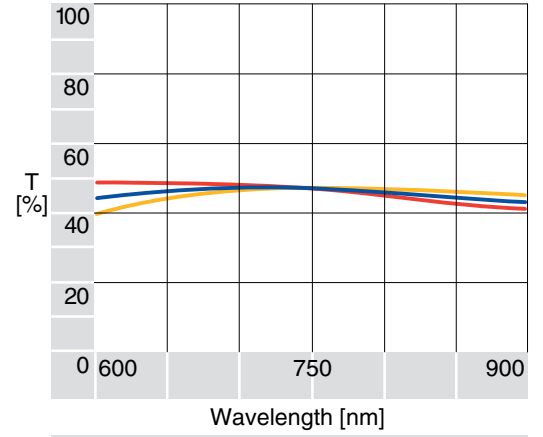
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- Beamsplitters

- Polarizers
- Filter & Apertures



**LOW-POLARIZING BEAMSPLITTER
TRANSMITTANCE 400-700 nm**

Ts ——— Tav ———
Tp ———



**LOW-POLARIZING BEAMSPLITTER
TRANSMITTANCE 600-900 nm**

Ts ——— Tav ———
Tp ———

Low-Polarizing Cube Beamsplitters

Wavelength Range (nm)	Cube Side, a (inches) (mm)	Price	PART NUMBER
400-700	0.20 5.0	\$ 139.00	039-0230
400-700	0.40 10.0	\$ 139.00	039-0235
400-700	0.59 15.0	\$ 139.00	039-0240
400-700	0.79 20.0	\$ 152.00	039-0245
600-900	0.20 5.0	\$ 139.00	039-0250
600-900	0.40 10.0	\$ 139.00	039-0255
600-900	0.59 15.0	\$ 139.00	039-0260
600-900	0.79 20.0	\$ 152.00	039-0265

The Low-polarizing Cube Beamsplitters described here are ideal for almost all general purpose applications. By design they make an excellent compromise between non-polarization of metallic splitters and the non-absorption of dielectric splitters.

Larger sizes and additional wavelengths of low-polarizing cube beamsplitters are available on request.



Our cube beamsplitter assembly takes place in a clean room environment to ensure high quality.

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Spherical Lenses

Cylindrical Lenses

Lens Kits

Achromatic Doublets

Multi-Element

Micro Optics

Mirrors

Prisms

Substrates & Windows

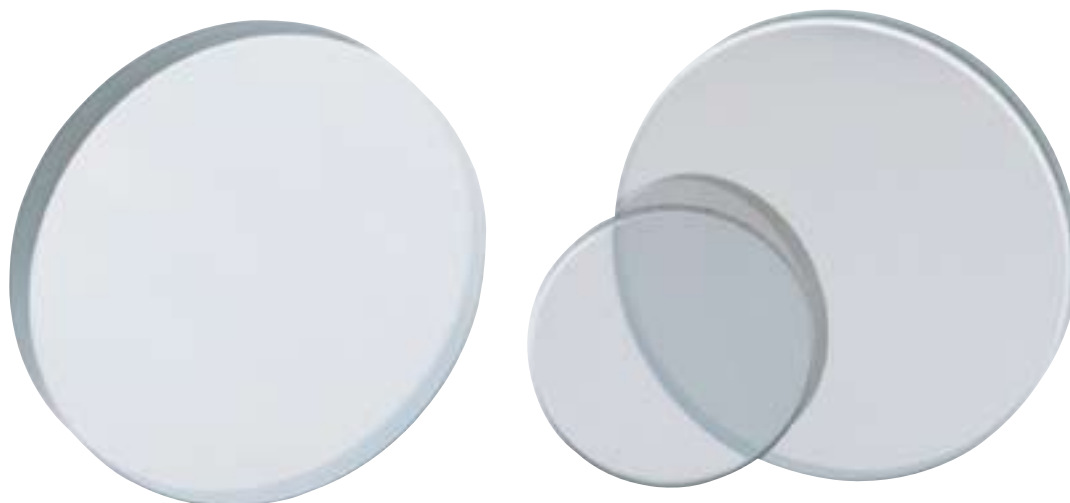
Beamsplitters

Polarizers

Filter & Apertures

Metallized Plate Beamsplitters

- The thin metallic film acts as broadband partially transmitting mirror
- Substrates polished both sides to $\lambda/10$
- Wedged substrates (for ghost suppression) are also available as standard
- Standard diameters from 25.4 to 100mm



These beamsplitters provide a highly neutral reflectivity over the visible spectrum and are most useful for broadband or tunable wavelength applications. A separate coating, optimized for use at the near-IR diode wavelengths, is available.

Specifications & Tolerances

Surface flatness: $\lambda/10$

Surface quality: 40-20

Thickness: ± 0.2 mm

Bevel: 0.2mmx45° typical

Transmission: $T_{av} = 33\% \pm 5\%$, 400-700nm

$T_{av} = 33\% \pm 5\%$, 750-850nm

Diameter: +0, -0.2mm

Parallelism: ≤ 5 arcsec or 1° wedge

Clear aperture: >90% diameter

Material: BK7, grade A

Wedge (optional): 1°

Metallized Plate Beamsplitters

Wavelength Range (nm)	Diameter, D (Inches)	Diameter, D (mm)	Thickness, t (mm)	Price	PART NUMBER
400-700	1.00	25.4	3.0	\$ 116.00	038-0120
400-700	1.18	30.0	3.0	\$ 131.00	038-0130
400-700	1.57	40.0	4.0	\$ 152.00	038-0135
400-700	1.97	50.0	5.0	\$ 173.00	038-0140
400-700	2.00	50.8	5.0	\$ 173.00	038-0150
400-700	3.94	100.0	10.0	\$ 625.00	038-0160
750-850	1.00	25.4	3.0	\$ 121.00	038-0210
750-850	1.18	30.0	3.0	\$ 137.00	038-0220
750-850	1.97	50.0	5.0	\$ 205.00	038-0230
750-850	2.00	50.8	5.0	\$ 205.00	038-0240

For a 1° **wedged** substrate **append -W** to the part number and add \$25 to the price.

Note: Wedged substrates are thicker.

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Metallized Cube Beamsplitters

- All four faces AR coated and flat to $\lambda/4$
- Inexpensive, yet effective for many beamsplitting requirements
- Both transmission/reflection typically 25% - with 50% absorption
- Standard cubes from 10 to 30mm

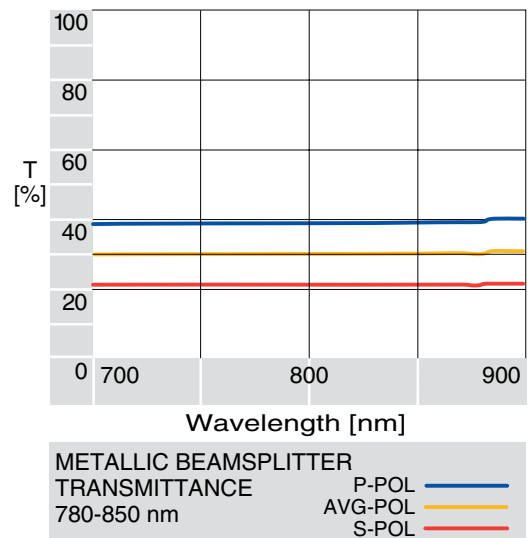
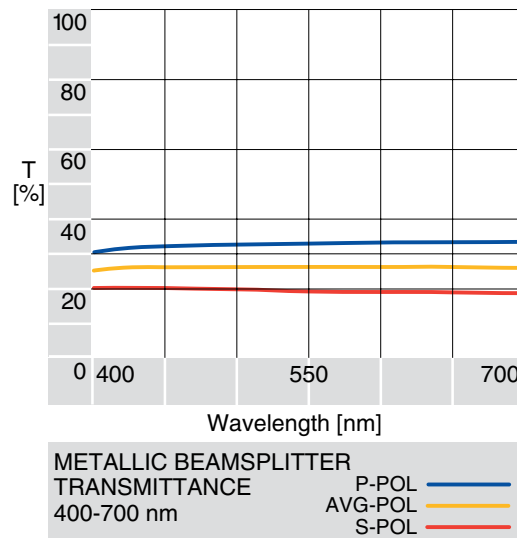
For white light applications where even intensity splitting is required over a broad wavelength region these simple cubes, with metallic coatings, make an ideal beamsplitter.



Specifications & Tolerances

Surface flatness: $\lambda/4$	Dimensions: $\pm 0.2\text{mm}$
Surface quality: 40-20	Beam deviation: $\leq 10\text{arcmin}$
Transmission: $T_{av} = 30\%$, 400-700nm	Material: BK7, grade A
$T_{av} = 30\%$, 780-850nm	

Metallic coatings absorb about 40-50% of the incident energy - transmitting typically 25% to one beam and 25% to the other. In applications where energy is limited (or often even worse, in high power applications) this energy loss may be unacceptable. In those situations all-dielectric coatings will be preferred.



Metallized Cube Beamsplitters

Wavelength Range (nm)	Cube Side, a (inches) (mm)		Price	PART NUMBER
400-700	0.39	10.0	\$ 74.00	039-0110
400-700	0.59	15.0	\$ 84.00	039-0120
400-700	0.79	20.0	\$ 110.00	039-0130
400-700	0.98	25.0	\$ 121.00	039-0140
400-700	1.18	30.0	\$ 173.00	039-0150
780-850	0.39	10.0	\$ 79.00	039-0170
780-850	0.59	15.0	\$ 95.00	039-0180
780-850	0.79	20.0	\$ 121.00	039-0190

Larger cube beamsplitters are available on request.

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Pellicle Beamsplitters

- No change in optical path length between reflected and transmitted light
- Pellicles eliminate second surface reflections
- Available in 1, 2 and 4 inch clear apertures
- Thickness uniformity is held to 2 waves per inch

Pellicles are thin nitrocellulose films which are stretched over a metal frame. Since they are less than 2 microns thick the reflected beams from both surfaces are essentially superimposed upon each other. Uncoated pellicles reflect 10% of the incident light when used at 45 degrees, thus providing a useful, low-intensity side beam. These pellicles can also be coated with various thin films in order to change the reflectivity and provide for a range of useful splitting ratios. See accompanying reflectivity curves.



The pellicles are offered in three sizes 1 inch, 2 inch, 4 inch clear aperture.

Specifications & Tolerances

Thickness uniformity: 2λ /inch

Surface quality: 40-20

Material: Nitrocellulose; nominal index 1.5

Diameter: +0, -0.5mm

Temperature range: -40°C to 150°C

Frame: Black anodized aluminum

Frame thickness: ± 0.1 mm

Coatings (@633nm): 8:92 - bare; 33:67 - dielectric; 40:40 - inconel; 50:50 - dielectric

Pellicles are only 2 microns thick - and yet they are surprisingly strong and rugged. Their very low mass can survive considerable acceleration or deceleration without deflection or damage.

Pellicle Beamsplitters

Aperture, A (Inches)	Frame Diameter, D (inches) (mm)		Frame Thickness, t (inches) (mm)		Split Ratio R:T	Price	PART NUMBER
1.00	1.38	34.9	0.19	4.8	10:90	\$ 79.00	038-3340
1.00	1.38	34.9	0.19	4.8	33:67	\$ 168.00	038-3670
1.00	1.38	34.9	0.19	4.8	40:40	\$ 168.00	038-3880
1.00	1.38	34.9	0.19	4.8	50:50	\$ 168.00	038-3550
2.00	2.50	63.5	0.25	6.4	10:90	\$ 110.00	038-3350
2.00	2.50	63.5	0.25	6.4	33:67	\$ 189.00	038-3680
2.00	2.50	63.5	0.25	6.4	40:40	\$ 189.00	038-3890
2.00	2.50	63.5	0.25	6.4	50:50	\$ 189.00	038-3560
4.00	4.50	114.3	0.25	6.4	10:90	\$ 194.00	038-3370
4.00	4.50	114.3	0.25	6.4	33:67	\$ 362.00	038-3770
4.00	4.50	114.3	0.25	6.4	40:40	\$ 362.00	038-4440
4.00	4.50	114.3	0.25	6.4	50:50	\$ 362.00	038-3580

Difference sizes and splitting ratios are available on request.

Spherical Lenses

Cylindrical Lenses

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Achromatic Doublets

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Polarizers

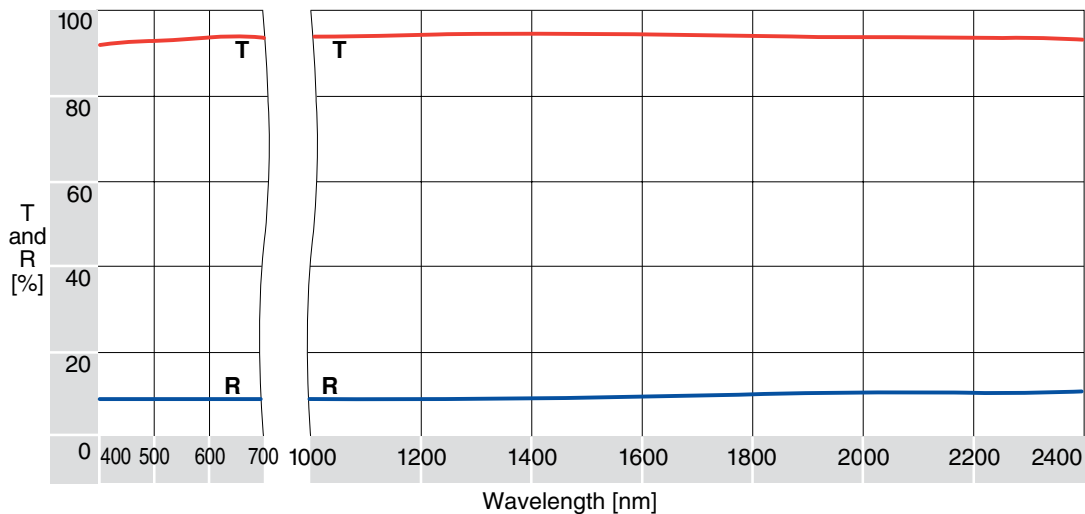
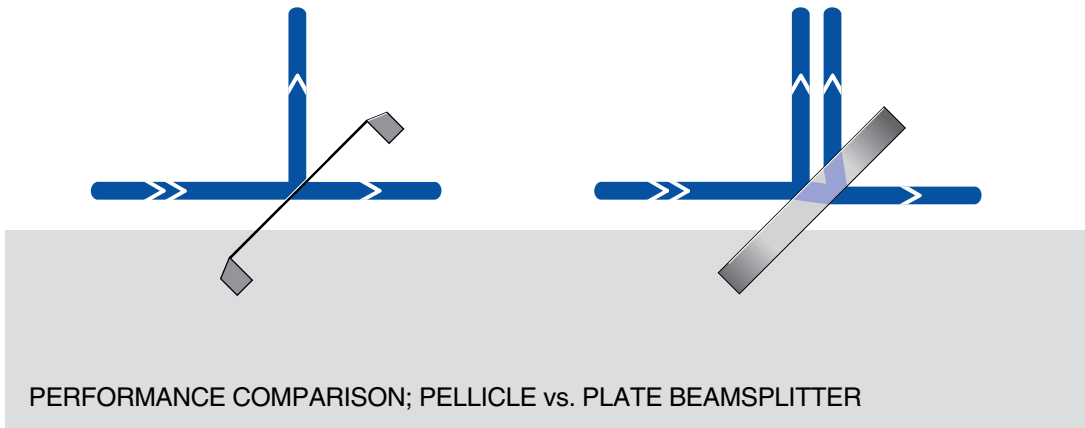
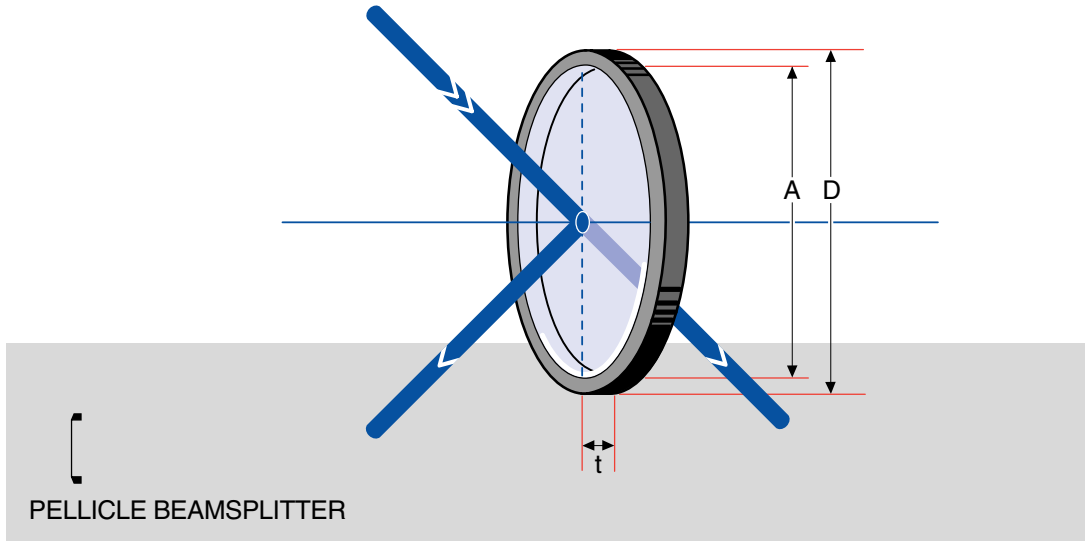
Filter & Apertures

OPTICAL COMPONENTS

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- Polarizers
- Filter & Apertures

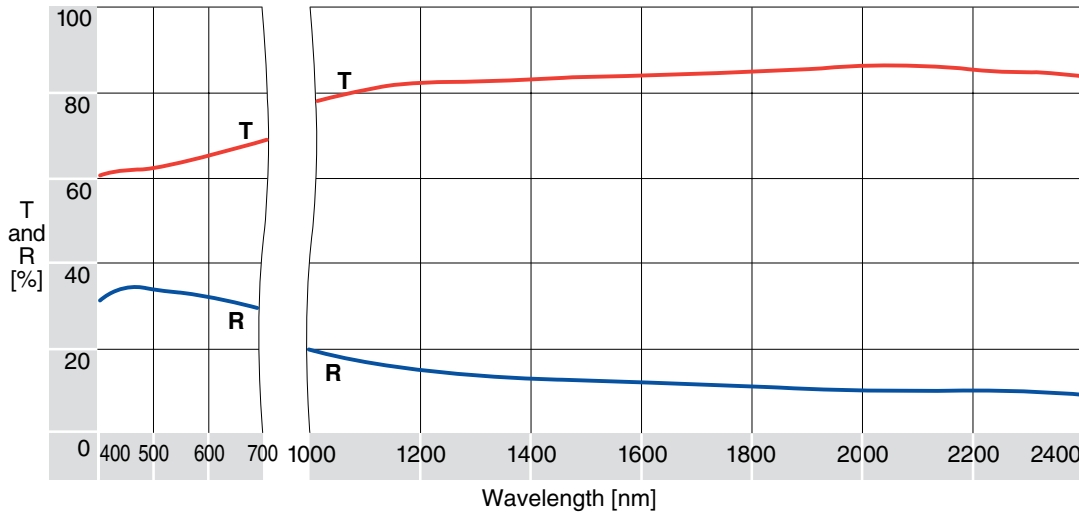


8:92 UNCOATED

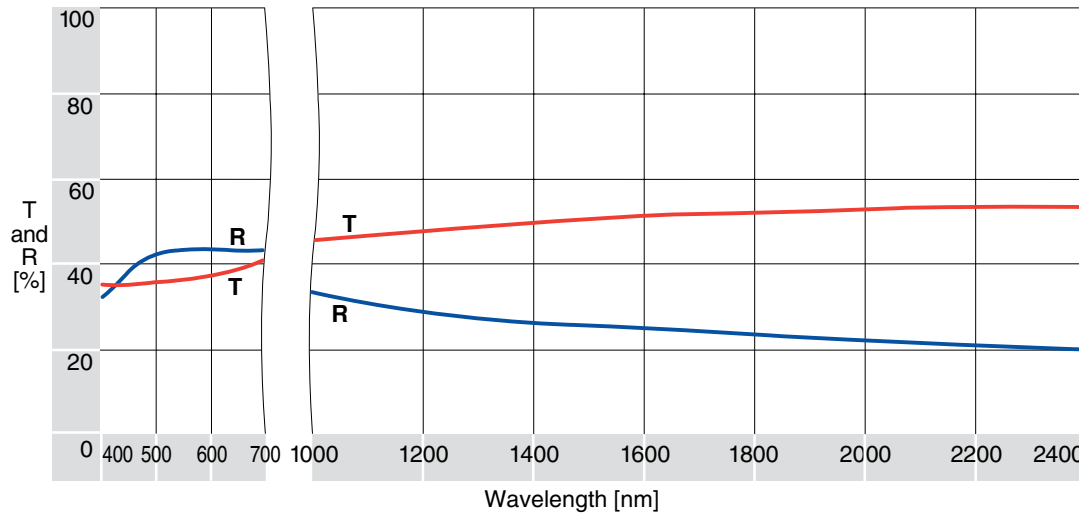
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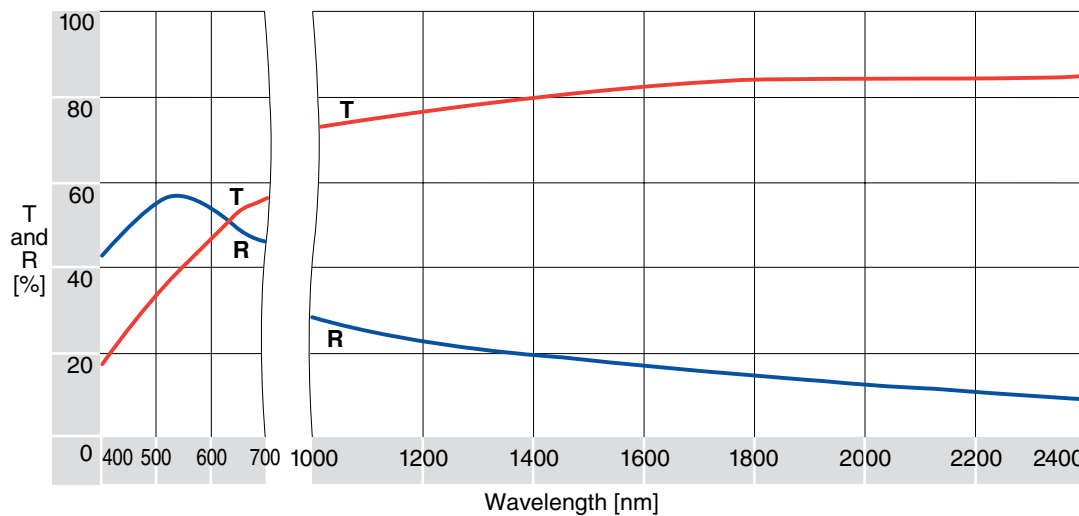
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33:67 DIELECTRIC



40:40 INCONEL



50:50 DIELECTRIC

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