LASER COMPONENTS®

High Power Beam Splitter with a Dielectric Coating

Description

Beam splitters are used for separation of one wavelength into two beams with different or same energy. This can be done by beam splitter cubes or for highest power densities with dielectric coted beam splitter plates, as described below.

Features / Characteristics

Beam splitters can be manufactured on a standard basis for the wavelength range from 248 nm to 3 µm. The angle of incidence for standard beam splitters is typically 45°, however, other angles are also possible on request. Dielectric beam splitter plates feature high laser damage thresholds.

- LIDT:
  The dielectric beam splitter are suitable for high power applications. The LIDT value depends on the design, wavelength. Please contact for LIDT values our sales team.
- Less Material:
  Less material in transmission compared to beam splitter cubes. This can be an advantage regarding bulk absorption and dispersion. But a beam offset for the transmitted beam has to be considered.
- Types of beam splitter:
  - Standard beam splitter
  - Polarization independent beam splitter
  - Double wavelength beam splitter
- Wavelength:
  LASER COMPONENTS can manufacture beam splitter plates in the range of 248 nm – 3000 nm

Applications

Beam splitter are used for separation of one wavelength in two portions of a wavelength.

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Specifications and Simulation

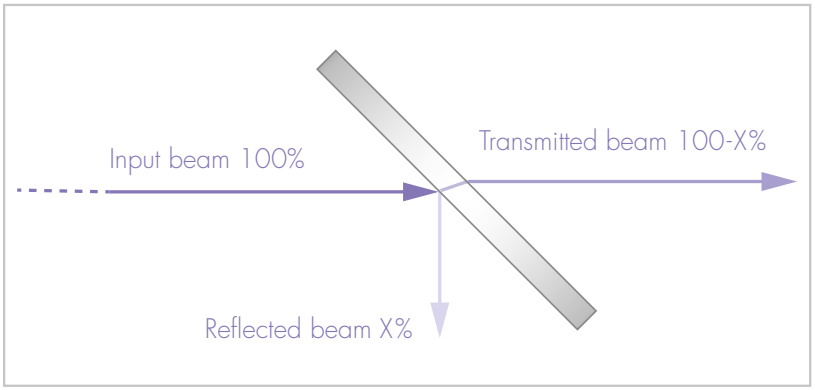
Standard Beam Splitter

These optics are primarily used in external beam guidance to separate the beam into two defined parts. The angle of incidence for standard beam splitters is typically 45°, however, other angles are also possible on request.

Function

The reflection is normally guaranteed for one polarization.

A standard beamsplitter that is manufactured for R = 50 % s-pol will have a different degree of reflectivity for p-pol radiation or unpolarized light.



Specifications

All values apply for a single wavelength (not wavelength ranges), one angle of incidence, and one polarization at an AOI not equal to 0.

- Standard tolerance:
  ± 2 % for R < 10 %
  ± 3 % for R = 10 to 40 %
  ± 5 % for R = 40 to 60 %
  ± 3 % for R = 60 to 90 %
  < 1 % for R > 90 %
- Exception 248 nm – 308 nm:
  < 1 % for R < 10 %
  ± 2 % for R = 10 to 20 %
  ± 5 % for R = 20 to 80 %
  ± 2 % for R = 80 to 95 %
  < 1 % for R > 95 %

Better tolerances are possible, please define what is needed.

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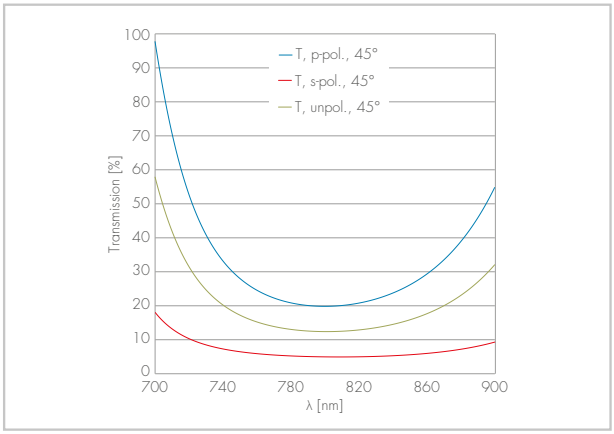
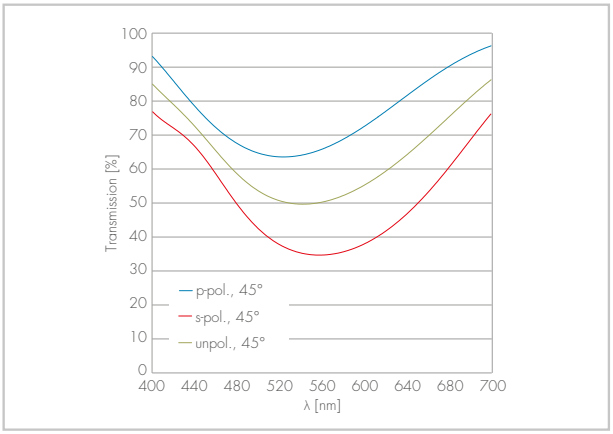
BS800/45 P80; AOI 45°; Rp(800) = 80%
e-beam including information for other polarizations



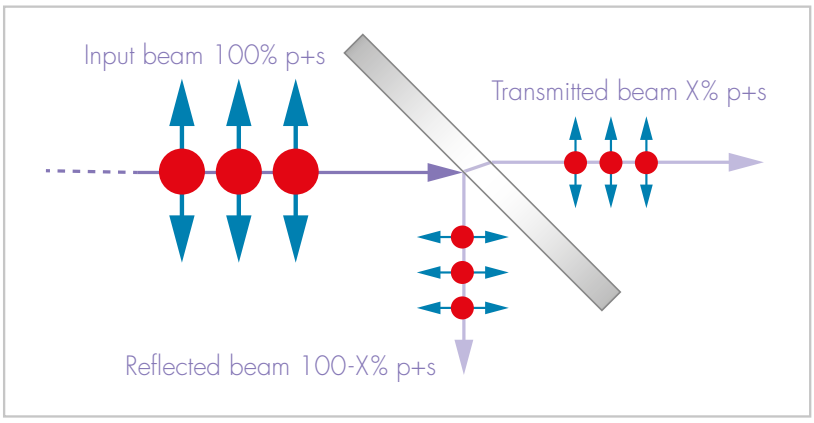
BS532/45 U50; AOI 45°; Ru(532) = 50%
e-beam including information for other polarizations



Polarization-Independent Beam Splitter

Polarization-independent beam splitters are optimized for use with circularly polarized light because an identical degree of reflection can be achieved for each polarization direction. The figure shows the coating for Rs = Rp = 50%. Polarization independent beam splitters can be manufactured in the wavelength range from 355 nm to 1064 nm.

Function



To avoid any difference for the beam splitting ratio e.g. for circular polarized beams, for this beam splitter the reflectivity and transmission are stable also if the polarization of the beam varies during the application.

If additionally an polarization maintaining beam splitter or non-polarizing beam splitter is needed the phase needs to be considered, else the polarization is modified. Please define if this is needed additionally.

The design can be optimized only for one wavelength and one angle of incidence.
The rear side AR coating is also optimized for s- and p-pol.

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Specifications

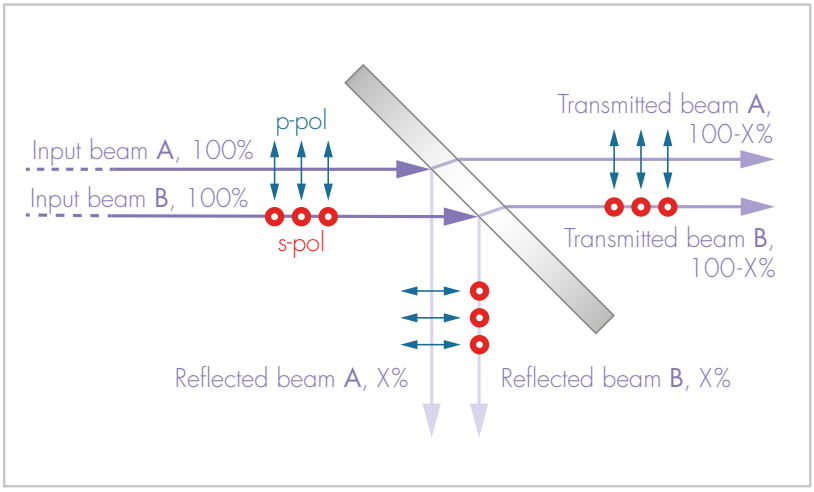
- **Degree of reflection**:
  e.g. R = 50 ± 3% for 532 nm
  Difference between s- & p-pol: < 3%
  Other specifications are available upon request.
- **Back reflection:**
  with AR coating (optimized for s- and p-pol):
  R < 0.4 % p-pol,
  R < 0.6 % s-pol

For polarization maintaining beam splitters: e.g. |Ps-Pp|<5°.

Multiple Beam Splitter

LASER COMPONENTS manufactures also customized beam splitters to be used for multiple wavelengths. This can be designed for various combination on R/T for different polarization.

Function



The beam splitter can be designed for one wavelength with reflectivity at s-pol and for the other wavelength at p-pol. This is especially useful when working with frequency doubled beams, as the polarization is typically perpendicular to each other. Thus, no waveplate for rotation of the polarization is needed.

The rear side AR coating is optimized as well for the polarization of each wavelength.

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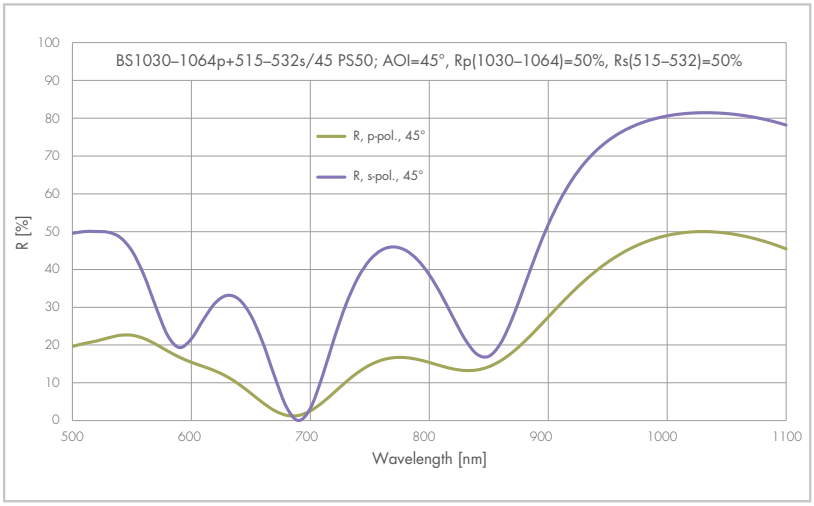

Specification

- **Degree of reflection:**
  e.g. Rp(λ1) = 50±3% and Rs(λ2) = 50±3%
- **Backreflection:**
  (with AR coating) optimized for the polarization per wavelength
  Rp(λ1) <1%, Rs(λ2) <1%

Good to know:

- Beam offset for transmitted beam
- For standard beam splitter the R and T value depends on the polarization
- Broad band beam splitter are possible the bandwidth depends on the reflection value chosen.

Customization:

We manufacture customized beam splitter that are suitable for your individual application.
For a request for a special beam splitter here is a list of specification we need to know:

- Wavelength and polarization 1
- Wavelength and polarization 2
- Angle of incidence
- R/T Wavelength 1
- R/T Wavelength 2
- Additional reflection at other wavelength
- Additional transmission at other wavelength
- Laser data (energy density, pulse duration, rep. rate) for each wavelength
- Substrate specification (diameter, thickness, flat/curved, material)

Just fill out the online request or contact us by email or phone

https://www.lasercomponents.com

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Product Code

Nomenclature

Beam Splitter; Angle of Incidence 45°

BS	532	/45	U50	/AR	PW1025UV
Beam Splitter coating	Wavelength in nm	Angle of incidence in degree	Reflection in % for the specified polarization (u-, s-, or p-pol)	AR coating on the rear side (if desired)	Substrate

Beam Splitter; Angle of Incidence 45°; $R_P = R_S$

BS	1064	/45	S = P50	/AR	PW1025UV
Beam Splitter coating	Wavelength in nm	Angle of incidence in degree	Reflection in % (for s- and p-pol)	AR coating on the rear side (if desired)	Substrate

Double Beam Splitter; Angle of Incidence 45°

BS	1064p	+532s	/45	PS50	/DAR	PW1025UV
Beam Splitter coating	Wavelength 1 in nm and polarization	Wavelength 2 in nm and polarization	Angle of incidence in degree	Reflection in % (for s- and p-pol)	AR coating on the rear side (if desired)	Substrate

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