What are the specifications of beam splitters

Article Overview

Beam splitters are optical devices designed to divide an incident light beam into transmitted and reflected components, with specifications defined by type, splitting ratio, wavefront quality, polarization, geometry, and wavelength range.

Types and Construction

Beam splitters are commonly classified as cube or plate types. Cube beam splitters are made from two right-angle prisms cemented together, often with a coated hypotenuse to achieve a specific reflection/transmission (R/T) ratio . Plate beam splitters are thin, flat glass plates with a partially reflective coating on one surface, typically designed for a 45? angle of incidence (AOI) and often include anti-reflection coatings on the opposite surface . Polarizing beam splitters, such as Wollaston prisms, use birefringent materials to separate orthogonal polarization states .

Splitting Ratio

The splitting ratio defines the proportion of light reflected versus transmitted. Standard beam splitters often have fixed ratios (e.g., 50/50), while variable beam splitters allow continuous adjustment using rotating disks with gradient coatings or a combination of a half-wave plate and a polarizing beam splitter . This enables precise control of power distribution between output beams.

Wavefront Quality

Beam splitter performance is affected by wavefront errors. Reflected wavefront error (RWE) and transmitted wavefront error (TWE) quantify deviations from ideal plane wavefronts due to surface curvature, unevenness, or wedge errors . Flatness is typically specified in peak-to-valley (PV) or root mean square (RMS) units relative to a reference wavelength (e.g., 632.8 nm ANSI standard or 546.07 nm ISO standard) over a defined aperture, often 25.4 mm in diameter . High-precision applications, such as TIRF or STED microscopy, require minimal wavefront distortion.

Polarization and Coatings

Beam splitters can be non-polarizing or polarizing. Non-polarizing splitters are designed for unpolarized light, while polarizing splitters transmit p-polarized light and reflect s-polarized light . Coatings may include dielectric or metallic layers, such as aluminum, applied via physical vapor deposition to achieve desired reflectivity and wavelength selectivity .

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Geometries and Displacement

Beam splitters are available in cube, plate, and displacement geometries. Displacement beam splitters provide precise lateral or parallel separation of output beams, with arcsecond-level accuracy for high-precision optical systems . Cube geometries typically separate beams at 90?, while plate geometries are often used at 45? AOI.

Wavelength Range

Beam splitters are designed for specific wavelength ranges, commonly spanning from visible to near-infrared (e.g., 193-1550 nm for laser applications), . Some splitters are optimized for narrowband or broadband operation, while others are tailored for specific laser lines or polychromatic sources.

Additional Considerations

Other specifications include surface quality, substrate material, thermal stability, and damage threshold, which are critical for high-power laser applications or precision interferometry . The choice of beam splitter depends on the application requirements, including polarization sensitivity, wavelength, splitting ratio, and wavefront fidelity. In summary, beam splitter specifications encompass type, splitting ratio, wavefront error, polarization behavior, geometry, coatings, and wavelength range, all of which must be carefully selected to ensure optimal performance in optical systems .

This document describes how Keysight"s family of high performance beamsplitters offers industry-leading polarization and beam

Learn how beam splitters work, compare cube and plate designs, and explore applications in lasers, microscopy, and interferometry.

Beamsplitters are optical components used to split incident light at a designated ratio into two separate beams. Additionally,

Fiber optic beam splitters are used to divide light from one fiber into two or more fibers. Light from an input fiber is first collimated,

? What is an Optical Splitter? An Optical Splitter, also known as a beam splitter, is a passive optical device that divides

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These beamsplitters are made from high grade glass materials with laser grade surface flatness and surface quality and have a

Matching the beam splitter"s specifications to the characteristics of the light source ensures optimal performance. This

A beam splitter or beamsplitter is an optical component that is used for splitting an incident light beam in two directions.

This buyer"s guide for beam splitters provides technical background, comparison of major types, selection criteria, and an overview of

A beam splitter is a device used to separate or combine light. It is widely used in guiding

When working with lasers, it is often necessary to split a laser beam into two or more defined partial beams. There are a variety of

Explore different types of beam splitters and their applications. Learn how beam splitters work and find the

Beam splitters are a fundamental element in optical systems. Beam splitters are, in essence, optical components used

To select the correct beam splitter housing for your system, you"ll need to choose the aperture size, optic diameter, and optic

The diffractive beam splitter is used with monochromatic light such as a laser beam, and is designed for a

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