

Holographic Wire-Grid Polarizers

Polarizers are commonly used to polarize radiation from unpolarized sources, attenuate radiation from polarized sources, or act as polarizing beamsplitters. Specac offers a range of holographic wire-grid polarizers for use in the 2 – 30µm spectral range.



These precision polarizers are manufactured in a class 1000 clean room facility at Specac's United Kingdom factory, by means of a holographic fabrication technique originally developed in conjunction with the United Kingdom's National Physical Laboratory (NPL). The process involves exposing a photo-resist coating on a suitable material substrate to an interferometrically-generated fringe pattern from a monochromatic UV source. The regular sinusoidal profile of the developed photo-resist is subsequently metal coated at an oblique angle to create an array of fine parallel lines at a set period.

This technique lends itself well to the generation of extremely uniform sub-micron grid wire spacings (2500 - 4000 lines/mm), which have a significantly reduced level of light scattering in comparison to traditional ruled wire grid polarizers. As the wire grid is formed on the photo-resist

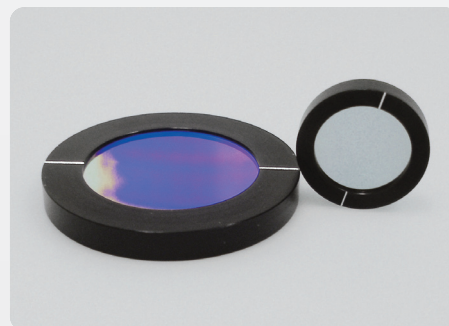
itself, the technique is also well suited to fabricating polarizers on substrates that do not otherwise lend themselves to the ruling process.

Specac offers a range of polarizers on infrared materials such as Barium Fluoride (BaF₂), Calcium Fluoride (CaF₂), KRS-5, Zinc Selenide (ZnSe), and Germanium (Ge), in a range of categories to meet a broad scope of customer requirements.

Standard, High Extinction Ratio (HER), and Image Quality High Extinction Ratio (IQ-HER) polarizers are offered mounted or unmounted, with a range of diameters from 25 to 75 mm depending on substrate material. Square polarizers in these categories are also available upon request. The performance of Specac polarizers does not vary significantly with change of incident angle between 0 to 20 degrees.

Applications

- Infrared spectroscopy of materials (typically plastics/polymers and crystallography)
- Infrared microscopy (sample characterization)
- NIR/Mid-IR thermal imaging systems
- Plasma diagnostics
- Beamsplitters in polarized light interferometry
- Analysis in infrared astronomy
- Low power laser polarization and beam attenuation
- Coupling devices for Mid-IR and long wavelength lasers



- Illustrations, descriptions and specifications in this data sheet were correct at the time of going to press. However, Specac's policy is one of continuous product development and we reserve the right to change descriptions and specifications at any time. For the latest details please contact your local Specac office or representative.

Specac Economy Polarizers

Specac offer a range of 'economy' polarizers from stock in standard 25 or 50 mm support rings. These are provided on Barium Fluoride (BaF₂), Calcium Fluoride (CaF₂), KRS-5, and Zinc Selenide (ZnSe) substrates, and are manufactured at 2500 lines/mm to provide acceptable polarization performance at an economical price.

Economy Polarizers Specifications

Wire Grid Spacing:
2500 lines/mm

Mounting Ring Diameters:
25.0 +0.0/-0.2 mm
50.0 +0.0/-0.2 mm

Mounting Ring Thickness:
5.0 ±0.1 mm (Ø 25 mm)
6.0 ±0.1 mm (Ø 50 mm)

Polarizer Clear Aperture:

18.0 ±0.1 mm (Ø 25 mm)

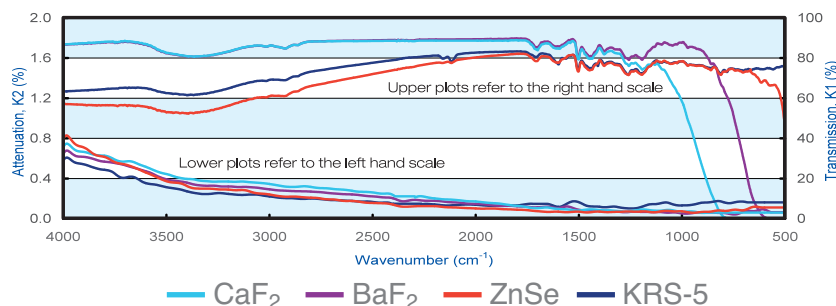
34.0 ±0.1 mm (Ø 50 mm)

Substrate Thickness:

2.0 +0.0/-0.2 mm (Ø 25 mm)

4.0 +0.0/-0.2 mm (Ø 50 mm)

Typical Transmission (K1) and Attenuation (K2) Plots for Specac Economy Polarizers



Polarizer categories

Economy Polarizers - these polarizers are offered from stock on BaF₂, CaF₂, KRS-5, and ZnSe substrates, in standard 25 or 50 mm support rings. They are manufactured at 2500 lines/mm, to provide acceptable polarization performance at an economical price.

Standard Polarizers - these polarizers are offered on BaF₂, CaF₂, KRS-5, Ge, and ZnSe substrates, in a choice of support rings. They are manufactured at 4000 lines/mm, to ensure enhanced performance at shorter wavelengths for precision applications.

High Extinction Ratio (HER) Polarizers - these polarizers are offered on BaF₂, CaF₂, KRS-5, Ge, and ZnSe substrates, in a choice of support rings. They are manufactured at 4000 lines/mm, with an enhanced coating process to ensure a higher degree of polarization extinction without jeopardising transmission throughput.

Image Quality High Extinction Ratio (IQ-HER) Polarizers - these polarizers are offered on Ge and ZnSe substrates, in a choice of support rings. They are manufactured at 4000 lines/mm, with an enhanced coating process to ensure higher degree of extinction without jeopardising transmission throughput. Anti-reflection coatings and a high specification of optical flatness and parallelism make these polarizers well suited for imaging applications.

Substrate Material	Wavelength (µm) / Wavenumber (cm ⁻¹)	Typical Extinction Ratio (K1/K2)
KRS-5	2.5 / 4000	100
	5 / 2000	300
	10 / 1000	300
CaF ₂	2.5 / 4000	100
	5 / 2000	300
	10 / 1000	300
BaF ₂	2.5 / 4000	100
	5 / 2000	300
	10 / 1000	400
ZnSe	2.5 / 4000	100
	5 / 2000	300
	10 / 1000	400

Part Number	Substrate Material	Mounting Ring Dia. (mm)	Parallelism (arc minutes)	Flatness (fringes per inch@633 nm)
GS57500	KRS-5	25	5	4
GS57501	CaF ₂	25	3	2
GS57502	BaF ₂	25	3	2
GS57503	ZnSe	25	3	2
GS57504	KRS-5	50	5	4
GS57505	CaF ₂	50	3	2
GS57506	BaF ₂	50	3	2
GS57507	ZnSe	50	3	2

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