colorPol® polarizers
the polarizer family Made in Germany

Applications

• Optical Communications
• Semiconductors
• Measurement Instrumentations
• Display Industries
• Medical Industries
• Laboratories
• R&D
• Space Industries
• Projectors
• ... and many more
The colorPol® family

colorPol® polarizers are dichroic glass polarizers, made from a highly durable soda-lime glass containing silver nanoparticles. Like all dichroic polarizers they let the desired polarized light pass and absorb the unwanted polarization. Different types of polarizers are available to suit a wide field of applications operating at UV wavelength range (340 nm - 420 nm) and VIS, NIR and MIR wavelength range (440 nm - 5.0 μm).

All polarizers can be processed like glass or silicon wafers, while being thin like foil polarizers. UV radiation and most chemicals cause no damage. They have a large acceptance angle of ± 20° and a high accuracy of polarization axis.

Standard colorPol® polarizer

- Transmittance up to 95% (with anti-reflection (AR)-coating)
- Ultraviolet, visible, near infrared and mid infrared versions available
- Temperature resistant between -50°C and +400°C
- Most economical choice for linear polarizer

High Transmittance colorPol® HT polarizer

- Transmittance up to > 96% (with AR-coating)
- Available for wavelengths 1310 nm, 1490 nm or 1550 nm (see page 8)
- High contrast ratio
- Thicknesses of 0.20 mm, 0.27 mm and 0.50 mm

Narrowband colorPol® N polarizer

- Contrast ratio > 10 000:1 (40 dB)
- Transmittance > 96% (with AR-coating)
- Optimized for one wavelength ±30 nm
- Developed for laser applications at 1310 nm, 1490 nm and 1550 nm
- Various thicknesses available: 0.2 mm, 0.27 mm and 0.5 mm
- The economic choice

Patterned colorPol® S polarizer

- Subdivided into segments
- Several polarization axes or wavelength ranges within one polarizer
- Opaque or transparent segments possible
- Unique manufacturing technology (see page 5)

colorPol® Laserline Nd:YAG polarizer

- Covers the laser wavelengths 355 nm, 532 nm and 1064 nm
- Contrast ratio > 10 000:1 (40 dB)
- Polarization axis at 355 nm perpendicular to 532 nm and 1064 nm
- Unique all-in-one polarizer - no filterchange necessary
The family colorPol® polarizers are dichroic glass polarizers, made from a highly durable soda-lime glass containing silver nanoparticles. Like all dichroic polarizers they let the desired polarized light pass and absorb the unwanted polarization. Different types of polarizers are available to suit a wide field of applications operating at UV wavelength range (340 nm - 420 nm) and VIS, NIR and MIR wavelength range (440 nm - 5.0 μm). All polarizers can be processed like glass or silicon wafers, while being thin like foil polarizers. UV radiation and most chemicals cause no damage. They have a large acceptance angle of ± 20° and a high accuracy of polarization axis.

**High Transmittance colorPol HT polarizer**
- Transmittance up to > 96% (with AR-coating)
- Available for wavelengths 310 nm, 490 nm or 550 nm (see page 8)
- High contrast ratio
- Thicknesses of 0.20 mm, 0.27 mm and 0.50 mm

**Patterned colorPol S polarizer**
- Subdivided into segments
- Several polarization axes or wavelength ranges within one polarizer
- Opaque or transparent segments possible
- Unique manufacturing technology (see page 5)

**Narrowband colorPol N polarizer**
- Contrast ratio > 10,000:1 (40 dB)
- Transmittance > 96% (with AR-coating)
- Optimized for one wavelength ±30 nm
- Developed for laser applications at 310 nm, 490 nm and 550 nm
- Various thicknesses available: 0.2 mm, 0.27 mm and 0.5 mm
- The economic choice

**colorPol Laserline Nd:YAG polarizer**
- Covers the laser wavelengths 355 nm, 532 nm and 1064 nm
- Contrast ratio > 10,000:1 (40 dB)
- Polarization axis at 355 nm perpendicular to 532 nm and 1064 nm
- Unique all-in-one polarizer - no filter change necessary

**Standard colorPol polarizer**
- Transmittance up to 95% (with anti-reflection (AR)-coating)
- Ultraviolet, visible, near infrared and mid infrared versions available
- Temperature resistant between -50°C and +400°C
- Most economical choice for linear polarizer

**Customization options**
- **Size**: Up to 100 x 60 mm² as one piece
- **Shape**: Square, circle, ring, octahedron, ...
- **Polarization axis**: Any defined angle to chosen edge
- **Lamination**: One or both sides
  - Transmitted wavefront distortion (TWD) < λ/4 (at 633 nm over Ø10 mm)
  - Beam deviation < 1 arc min.
  - Reduced temperature resistance
  - Standard thickness between 0.8 mm and 2.0 mm
  - Other thicknesses are available upon request
- **Anti-Reflection coating**: One or both sides
  - Increased transmittance
  - Reduced reflections
- **Marked polarization axis**: On polarizer or mount
- **Mounted**: Better handling
- **Wavelength range of polarization**: Wavelength range of polarization can be customized within the covered wavelength range (340 nm - 420 nm, 440 nm - 5.0 μm)

For any other special requirements, please contact CODIXX or your local distributor.
The unique colorPol® technology

Raw colorPol® polarizer

colorPol® polarizers are made of soda lime glass with silver nanoparticles embedded near both surfaces. The thickness of the silver nanoparticle layer depends on the polarizer type. Unlaminated polarizers have a thickness between 0.2 mm and 0.5 mm.

Nanoparticles near surface

The technology used by CODIXX allows a controlled size, density and shape of the nanoparticles. The prolate shape is needed to create a short and a long symmetry axis. These axes cause a wavelength dependent absorption and therefore polarization. To achieve the excellent polarization properties of colorPol®, the long axes are aligned perfectly parallel and result in a strong linear polarization.

Single prolate nanoparticle with symmetry axes

Between 340 nm and 420 nm only light perpendicular to the short axis (blue) can pass, while the rest will be absorbed or reflected, thus creating polarized light. From 450 nm the long symmetry axis (red) takes over the polarization and is the reason for the perpendicular polarization axes of UV compared to VIS/IR wavelength range.

This leaves a gap between 420 nm and 450 nm with nearly no polarization, which can only be shifted a little, but not completely avoided.

Schematic absorption spectra of soda lime glass containing uniformly oriented silver nanoparticles
Patterned polarizers

In difference to a common linear polarizer, which provides the same optical properties over the whole clear aperture, a patterned polarizer is subdivided into segments. The segments may have different optical properties like the orientation of the polarization axis or wavelength range, or can be opaque or transparent. Size, shape and number of segments with different optical properties determine which of CODIXX’s unique manufacturing technology is applicable.

Mosaic technology

colorPol\textsuperscript{®} is well suited for this classical method of manufacturing patterned polarizers. Different polarization directions as well as different wavelength ranges can be chosen for each segment. Size, shape and number of segments is limited due to the production process.

Lithographic technology

The polarization of colorPol\textsuperscript{®} polarizers is caused by elongated silver nanoparticles, which are embedded into the glass only in a shallow depth. This specific design offers the possibility to remove these nanoparticles by surface etching. With lithography, this can be done selectively.

A patterned colorPol\textsuperscript{®} polarizer with regions of either transparent or linear polarizing properties is the result. The shape of these regions can be randomly chosen, the resolution can be as high as 30 µm at still reasonable costs. The polarization axis of all regions as well as the wavelength range is same.

The thin glass polarizers are diced precisely, for example with wafer saws. Every single piece is assembled carefully in the desired order. Lastly, the whole mosaic is sandwiched between two carrier substrates.

To create a polarizer with regions of different polarization axes, at least two of the polarizers, which were patterned as described above, must be stacked on top of each other (see sketch above). The more different orientations of the polarization axis are needed, the more planes must be stacked. The different height positions of the planes may cause a parallax.
# Standard polarizers

<table>
<thead>
<tr>
<th>colorPol® type</th>
<th>Wavelength range [nm]</th>
<th>Transmittance [%]</th>
<th>Contrast ratio $k_1/k_2$</th>
<th>Thickness unlaminated [µm]</th>
<th>Thickness laminated [mm]</th>
<th>Maximum dimension [mm x mm]</th>
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</thead>
<tbody>
<tr>
<td>UV 375 BC5</td>
<td>385 - 375</td>
<td>&gt;40-47</td>
<td>&gt;100 000:1</td>
<td>220±50</td>
<td>2.0±0.2</td>
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<td></td>
<td>360 - 397</td>
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<tr>
<td></td>
<td>357 - 403</td>
<td>&gt;39-48</td>
<td>&gt;10 000:1</td>
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<tr>
<td>UV 380 BC4</td>
<td>372 - 388</td>
<td>&gt;52-57</td>
<td>&gt;100 000:1</td>
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<td>2.0±0.2</td>
<td>≤100x50</td>
</tr>
<tr>
<td></td>
<td>369 - 390</td>
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<td>&gt;10 000:1</td>
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<tr>
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<td>365 - 395</td>
<td>&gt;51-59</td>
<td>&gt;1 000:1</td>
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<tr>
<td>VIS 500 BC3</td>
<td>475 - 625</td>
<td>&gt;55-81</td>
<td>&gt;1 000:1</td>
<td>280±50</td>
<td>2.0±0.2</td>
<td>≤100x60</td>
</tr>
<tr>
<td>VIS 500 BC3 CW01 (AR coated)</td>
<td>475 - 625</td>
<td>&gt;58-90</td>
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<tr>
<td>VIS 500 BC4</td>
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<td>&gt;58-76</td>
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<td>≤100x60</td>
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<td>VIS 500 BC4 CW01 (AR coated)</td>
<td>480 - 550</td>
<td>&gt;62-82</td>
<td>&gt;10 000:1</td>
<td>280±50</td>
<td>2.0±0.2</td>
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<tr>
<td>VIS 600 BC5</td>
<td>530 - 640</td>
<td>&gt;62-78</td>
<td>&gt;100 000:1</td>
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<td>2.0±0.2</td>
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<td>&gt;10 000:1</td>
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<tr>
<td></td>
<td>510 - 800</td>
<td>&gt;55-83</td>
<td>&gt;1 000:1</td>
<td></td>
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<tr>
<td>VIS 600 BC5 CW01 (AR coated)</td>
<td>530 - 640</td>
<td>&gt;66-83</td>
<td>&gt;100 000:1</td>
<td>280±50</td>
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<tr>
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<td>520 - 740</td>
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<td>&gt;10 000:1</td>
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<td></td>
<td>510 - 750 [800]</td>
<td>&gt;58-86</td>
<td>&gt;1 000:1</td>
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<tr>
<td>VIS 700 BC3</td>
<td>550 - 900</td>
<td>&gt;77-86</td>
<td>&gt;1 000:1</td>
<td>220±50</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
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<td>VIS 700 BC3 CW03 (AR coated)</td>
<td>550 - 900</td>
<td>&gt;84-93</td>
<td>&gt;1 000:1</td>
<td>220±50</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
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<tr>
<td>VIS 700 BC4</td>
<td>600 - 850</td>
<td>&gt;78-88</td>
<td>&gt;10 000:1</td>
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<td>2.0±0.2</td>
<td>≤100x50</td>
</tr>
<tr>
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<td>600 - 1 000</td>
<td>&gt;78-88</td>
<td>&gt;10 000:1</td>
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<tr>
<td>VIS 700 BC4 CW02 (AR coated)</td>
<td>600 - 850</td>
<td>&gt;84-93</td>
<td>&gt;10 000:1</td>
<td>220±50</td>
<td>2.0±0.2</td>
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<td>600 - 1 000</td>
<td>&gt;84-95</td>
<td>&gt;10 000:1</td>
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<td>VISIR</td>
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<td>&gt;67-84</td>
<td>&gt;100 000:1</td>
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<tr>
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<td>550 - 1 500</td>
<td>&gt;57-85</td>
<td>&gt;10 000:1</td>
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<td>VISIR CW02 (AR coated)</td>
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<td>&gt;71-88</td>
<td>&gt;100 000:1</td>
<td>260±50</td>
<td>2.0±0.2</td>
<td>≤100x60</td>
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<td>IR 950 BC4</td>
<td>800 - 1 100</td>
<td>&gt;85-87</td>
<td>&gt;10 000:1</td>
<td>220±50</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
</tr>
<tr>
<td></td>
<td>600 - 1 320</td>
<td>&gt;80-88</td>
<td>&gt;10 000:1</td>
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<tr>
<td>IR 950 BC4 CW02 (AR coated)</td>
<td>800 - 1 100</td>
<td>&gt;90-94</td>
<td>&gt;10 000:1</td>
<td>220±50</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
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<tr>
<td></td>
<td>600 - 1 150</td>
<td>&gt;82-94</td>
<td>&gt;10 000:1</td>
<td></td>
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<tr>
<td>IR 1100 BC4</td>
<td>900 - 1 200</td>
<td>&gt;85-87</td>
<td>&gt;100 000:1</td>
<td>220±50</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
</tr>
<tr>
<td></td>
<td>750 - 1 400</td>
<td>&gt;83-87</td>
<td>&gt;10 000:1</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>650 - 1 700</td>
<td>&gt;80-88</td>
<td>&gt;10 000:1</td>
<td></td>
<td></td>
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<tr>
<td>IR 1100 BC4 CW02 (AR coated)</td>
<td>900 - 1 200</td>
<td>&gt;91-94</td>
<td>&gt;100 000:1</td>
<td>220±50</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
</tr>
<tr>
<td></td>
<td>750 - 1 250</td>
<td>&gt;89-94</td>
<td>&gt;10 000:1</td>
<td></td>
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<tr>
<td></td>
<td>650 - 1 250</td>
<td>&gt;86-94</td>
<td>&gt;10 000:1</td>
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<tr>
<td>IR 1300 BC5</td>
<td>850 - 1 600</td>
<td>&gt;82-86</td>
<td>&gt;100 000:1</td>
<td>220±50</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
</tr>
<tr>
<td></td>
<td>750 - 1 800</td>
<td>&gt;80-87</td>
<td>&gt;10 000:1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>650 - 2 000</td>
<td>&gt;76-87</td>
<td>&gt;10 000:1</td>
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<tr>
<td>NIR</td>
<td>1 000 - 2 700</td>
<td>&gt;77</td>
<td>&gt;10 000:1</td>
<td>250±65</td>
<td>2.0±0.2 at other wavelength ranges1</td>
<td>≤100x60</td>
</tr>
<tr>
<td></td>
<td>2 000 - 3 000</td>
<td>&gt;70</td>
<td>&gt;1 000:1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 200 - 3 000</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>1 000 - 3 000</td>
<td></td>
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<tr>
<td>MIR</td>
<td>2 000 - 4 500</td>
<td>&gt;65-90</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
</tr>
<tr>
<td></td>
<td>1 500 - 5 000</td>
<td>&gt;35-90</td>
<td>&gt;1 000:1</td>
<td></td>
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</tr>
</tbody>
</table>

1 The contrast ratio is defined to be $k_1/k_2$, where $k_1$ is the transmittance of a polarized beam passing the filter and $k_2$ is the transmittance of a polarized beam blocked by the filter.

2 Wavelength range up to 2 650 nm and with modified transmittance

Contrast ratios >100 000:1, other thicknesses, shapes or dimensions available on special request. Reflection losses can be minimized by anti-reflection-coatings. AR-coatings are available for different wavelength ranges as V-coating or wide-band version.

CODIXX AG reserves the right to change technical information without notice.
Typical performance of standard polarizers

- Standard polarizers
- VISIR
- VIS 600 BC5 CW01 (AR coated)
- UV 375 BC5
- NIR
- IR 1100 BC4
- VIS 700 BC3 CW02 (AR coated)
- VIS 700 BC3
- VIS 500 BC3 CW01 (AR coated)
- VIS 500 BC3

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The contrast ratio is defined to be \( \frac{k_1}{k_2} \), where \( k_1 \) is the transmittance of a polarized beam passing the filter and \( k_2 \) is the transmittance of a polarized beam blocked by the filter.

Transmittance with AR coating CW02
- VIS 600 BC5
- VIS 500 BC4
- VIS 700 BC3

Maximum dimensions:
- \( \leq 100 \times 50 \) [mm]

Contrast and Transmittance:
- VIS 375 BC5
- VIS 380 BC4
- VIS 500 BC4
- VIS 700 BC3
- IR 950 BC4
- NIR

The graphs should be considered typical only. Guaranteed values are given in the corresponding table on the previous page.
colorPol® polarizers

Typical performance of high transmittance polarizers

The graphs should be considered typical only. Guaranteed values are given in the corresponding table.
### High transmittance polarizers

<table>
<thead>
<tr>
<th>colorPol® type</th>
<th>Wavelength range [nm]</th>
<th>Transmittance [%]</th>
<th>Contrast ratio $k_l:k_r$</th>
<th>Thickness unlaminated [µm]</th>
<th>Thickness laminated [µm]</th>
<th>Maximum dimension [mm x mm]</th>
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<tr>
<td>IR 1310 BC4 HT</td>
<td>1 280 - 1 500</td>
<td>&gt;88</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>270±50</td>
<td>≤100x50 ≤100x60 ≤100x27</td>
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<tr>
<td>IR 1310 BC4 HT (laminated)</td>
<td>1 280 - 1 500</td>
<td>&gt;87</td>
<td>&gt;10 000:1</td>
<td>-</td>
<td></td>
<td>≤100x60</td>
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<tr>
<td>IR 1310 BC4 HT C1310 (AR coated)</td>
<td>1 280 - 1 500</td>
<td>&gt;96</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>270±50</td>
<td>≤100x50 ≤100x60 ≤100x27</td>
</tr>
<tr>
<td>IR 1310 BC4 HT C1310 (AR coated, laminated)</td>
<td>1 280 - 1 500</td>
<td>&gt;95</td>
<td>&gt;10 000:1</td>
<td>-</td>
<td></td>
<td>≤100x60</td>
</tr>
<tr>
<td>IR 1490 BC4 HT</td>
<td>1 450 - 1 530</td>
<td>&gt;88</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>270±50</td>
<td>≤100x50 ≤100x60 ≤100x27</td>
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<tr>
<td>IR 1490 BC4 HT (laminated)</td>
<td>1 450 - 1 530</td>
<td>&gt;87</td>
<td>&gt;10 000:1</td>
<td>-</td>
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<td>≤100x60</td>
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<tr>
<td>IR 1490 BC4 HT C1490 (AR coated)</td>
<td>1 450 - 1 530</td>
<td>&gt;96</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>270±50</td>
<td>≤100x50 ≤100x60 ≤100x27</td>
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<tr>
<td>IR 1490 BC4 HT C1490 (AR coated, laminated)</td>
<td>1 450 - 1 530</td>
<td>&gt;95</td>
<td>&gt;10 000:1</td>
<td>-</td>
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<td>≤100x60</td>
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<tr>
<td>IR 1550 BC4 HT</td>
<td>1 480 - 1 650</td>
<td>&gt;88</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>270±50</td>
<td>≤100x60 ≤100x50 ≤100x27</td>
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<tr>
<td>IR 1550 BC4 HT (laminated)</td>
<td>1 480 - 1 650</td>
<td>&gt;87</td>
<td>&gt;10 000:1</td>
<td>-</td>
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<tr>
<td>IR 1550 BC4 HT C1550 (AR coated)</td>
<td>1 480 - 1 650</td>
<td>&gt;96</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>270±50</td>
<td>≤100x50 ≤100x60 ≤100x27</td>
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<tr>
<td>IR 1550 BC4 HT C1550 (AR coated, laminated)</td>
<td>1 480 - 1 650</td>
<td>&gt;95</td>
<td>&gt;10 000:1</td>
<td>-</td>
<td></td>
<td>≤100x60</td>
</tr>
<tr>
<td>IR 2000 BC2 T2 HT</td>
<td>1 600 - 2 500 1 550 - 1 500</td>
<td>&gt;90</td>
<td>&gt;100:1</td>
<td>200±50</td>
<td>-</td>
<td>≤100x50</td>
</tr>
<tr>
<td>IR 2000 BC2 T2 HT (laminated)</td>
<td>1 600 - 2 150 2 150 - 2 500</td>
<td>&gt;82</td>
<td>&gt;100:1</td>
<td>-</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
</tr>
<tr>
<td>IR 2000 BC2 T2 HT CW06 (AR coated)</td>
<td>1 600 - 2 500</td>
<td>&gt;96</td>
<td>&gt;100:1</td>
<td>200±50</td>
<td>-</td>
<td>≤100x50</td>
</tr>
<tr>
<td>IR 2000 BC2 T2 HT CW06 (AR coated, laminated)</td>
<td>1 600 - 2 500</td>
<td>&gt;96</td>
<td>&gt;100:1</td>
<td>-</td>
<td>2.0±0.2</td>
<td>≤100x50</td>
</tr>
</tbody>
</table>

1 The contrast ratio is defined to be $k_l:k_r$, where $k_l$ is the transmittance of a polarized beam passing the filter and $k_r$ is the transmittance of a polarized beam blocked by the filter.

Contrast ratios >100,000:1, other thicknesses, shapes or dimensions available on special request. Reflection losses can be minimized by anti-reflection-coatings. AR-coatings are available for different wavelength ranges as V-coating or wide-band version.

CODIXX AG reserves the right to change technical information without notice.
Narrowband colorPol® N polarizer

<table>
<thead>
<tr>
<th>colorPol® type</th>
<th>Wavelength range [nm]</th>
<th>Transmittance [%]</th>
<th>Contrast ratio k₁:k₀</th>
<th>Thickness [µm]</th>
<th>Maximum dimension [mm x mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR 1310N BC4 T2 HT CS1310 (single side AR coated)</td>
<td>1 280 - 1 340</td>
<td>&gt;92</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>≤100x50</td>
</tr>
<tr>
<td>IR 1310N BC4 T2 HT C1310 (AR coated)</td>
<td>1 280 - 1 340</td>
<td>&gt;96</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>≤100x50</td>
</tr>
<tr>
<td>IR 1490N BC4 T2 HT CS1490 (single side AR coated)</td>
<td>1 460 - 1 520</td>
<td>&gt;92</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>≤100x50</td>
</tr>
<tr>
<td>IR 1490N BC4 T2 HT C1490 (AR coated)</td>
<td>1 460 - 1 520</td>
<td>&gt;96</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>≤100x50</td>
</tr>
<tr>
<td>IR 1550N BC4 T2 HT CS1550 (single side AR coated)</td>
<td>1 520 - 1 580</td>
<td>&gt;92</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>≤100x50</td>
</tr>
<tr>
<td>IR 1550N BC4 T2 HT C1550 (AR coated)</td>
<td>1 520 - 1 580</td>
<td>&gt;96</td>
<td>&gt;10 000:1</td>
<td>200±50</td>
<td>≤100x50</td>
</tr>
</tbody>
</table>

The contrast ratio is defined to be k₁:k₀, where k₁ is the transmittance of a polarized beam passing the filter and k₀ is the transmittance of a polarized beam blocked by the filter.

Contrast ratios >100 000:1, other thicknesses, shapes or dimensions available on special request. Reflection losses can be minimized by anti-reflection-coatings.

CODIXX AG reserves the right to change technical information without notice.

Typical performance of colorPol® N polarizers

The graphs should be considered typical only. Guaranteed values are given in the tables above.
Laserline Nd:YAG BC4

<table>
<thead>
<tr>
<th>colorPol® type</th>
<th>Wavelength [nm]</th>
<th>Transmittance [%]</th>
<th>Contrast ratio k_i/k_o</th>
<th>Thickness un laminated [µm]</th>
<th>Thickness laminated [mm]</th>
<th>Maximum dimension [mm x mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laserline Nd:YAG BC4</td>
<td>355 nm</td>
<td>&gt;37</td>
<td>&gt;10 000:1</td>
<td>270±50</td>
<td>2.0±0.2</td>
<td>≤100x27</td>
</tr>
<tr>
<td></td>
<td>532 nm</td>
<td>&gt;50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 064 nm</td>
<td>&gt;79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ The contrast ratio is defined to be k_i/k_o, where k_i is the transmittance of a polarized beam passing the filter and k_o is the transmittance of a polarized beam blocked by the filter.

Other thicknesses, shapes or dimensions available on special request.

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Typical performance of Laserline Nd:YAG

Sample Set

CODIXX offers sample sets for evaluation at an attractive price. Sample sets are customized compilations of either 4 or 6 polarizers out of the colorPol® standard or HT series.

Each sample set consists of a protective box, the selected polarizers fixed with foil on cardboard and the respective specifications.

Sample set polarizers are only available with 10 x 10 mm² dimensions. In one sample set, the maximum quantity of filters of the same type is limited to 2 pieces.

The shipment can be made within one working day after receipt of order.
Mounted polarizers

ColorPol® polarizers are available as mounted polarizers with the following standard mounts.

Other diameters are available on request.

Due to the used glue, mounted polarizers have the same temperature resistance as laminated polarizers.

<table>
<thead>
<tr>
<th>Diameter [mm]</th>
<th>Clear aperture [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>11.2</td>
</tr>
<tr>
<td>12.7</td>
<td>11.4</td>
</tr>
<tr>
<td>25.0</td>
<td>22.5</td>
</tr>
<tr>
<td>25.4</td>
<td>22.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diameter [mm]</th>
<th>Thickness [mm]</th>
<th>Clear aperture [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>2.0±0.2</td>
<td>11.2</td>
</tr>
<tr>
<td>25.0</td>
<td>2.0±0.2</td>
<td>22.5</td>
</tr>
</tbody>
</table>

Transmitted wavefront distortion < λ/4
at 633 nm per Ø 10 mm for polished parts

<table>
<thead>
<tr>
<th>Diameter [mm]</th>
<th>Clear aperture [mm]</th>
<th>Length [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5 e8</td>
<td>8.1</td>
<td>5 or 7</td>
</tr>
<tr>
<td>12.7 e8</td>
<td>8.1</td>
<td>5 or 7</td>
</tr>
<tr>
<td>25.0 e8</td>
<td>20.8</td>
<td>5 or 10</td>
</tr>
<tr>
<td>25.4 e8</td>
<td>20.8</td>
<td>5 or 10</td>
</tr>
</tbody>
</table>

**Technical specifications of colorPol®**

<table>
<thead>
<tr>
<th></th>
<th>Unlaminated</th>
<th>Laminated 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Parameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmitted wavefront distortion (TWD) at 633 nm over an inspection area of Ø10 mm</td>
<td>&lt; 3 λ</td>
<td>&lt; λ/4</td>
</tr>
<tr>
<td>Beam deviation</td>
<td>&lt; 20 arc min.</td>
<td>&lt; 1 arc min.</td>
</tr>
<tr>
<td>Accuracy of polarization axis to edge 2)</td>
<td>&lt; 0.5°</td>
<td></td>
</tr>
<tr>
<td>Acceptance angle 3), 4)</td>
<td>± 20°</td>
<td></td>
</tr>
<tr>
<td>Refractive index at 633 nm (RI)5)</td>
<td>1.520 ± 0.005</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Unlaminated</th>
<th>Laminated 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cosmetic Parameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usual surface quality (in dependence on MIL-O-13830: Scratch / Dig) 4)</td>
<td>40/20</td>
<td></td>
</tr>
</tbody>
</table>

ColorPol® polarizers follow completely the international RoHS, REACH and PFOS regulations.
### Mechanical Parameter

<table>
<thead>
<tr>
<th></th>
<th>Unlaminated</th>
<th>Laminated ¹</th>
<th>Laminated ²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear aperture (CA)</td>
<td>80% for parts &lt; 2 x 2 mm² 90% for parts &lt; 20 x 20 mm² 95% for parts ≥ 20 x 20 mm²</td>
<td>0.05 mm to 0.2 mm, dependent upon part size &lt; 0.05 mm on request</td>
<td></td>
</tr>
<tr>
<td>Edge chips ⁷</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific weight</td>
<td>2.5 ± 0.1 g/cm³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficient of elasticity E</td>
<td>70 ± 5 kN/mm²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Physical Parameter

<table>
<thead>
<tr>
<th></th>
<th>Unlaminated</th>
<th>Laminated ¹</th>
<th>Laminated ²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient of thermal expansion (CTE)</td>
<td>8.1 ± 0.3 x 10⁻⁶ K⁻¹ (0-100°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific heat</td>
<td>1.0 ± 0.1 J/gK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>0.94 ± 0.05 W/mK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Operation Limits

<table>
<thead>
<tr>
<th></th>
<th>Unlaminated</th>
<th>Laminated ¹</th>
<th>Laminated ²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser damage threshold (LDT)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Continuous wave (CW)</td>
<td>10 W/cm² continuous block 25 W/cm² continuous pass</td>
<td>1 W/cm² continuous block 5 W/cm² continuous pass</td>
<td></td>
</tr>
<tr>
<td>b) Pulsed</td>
<td>12 MW/cm² pulse peak power (equivalent of about 1 µJ/cm² pulse power density)</td>
<td>1 MW/cm² pulse peak power (equivalent of about 100 nJ/cm² pulse power density)</td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>up to +400°C</td>
<td>-20°C to +120°C</td>
<td></td>
</tr>
</tbody>
</table>

### Durability

<table>
<thead>
<tr>
<th></th>
<th>Unlaminated</th>
<th>Laminated ¹</th>
<th>Laminated ²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal cycle</td>
<td>-40°C to +80°C, 200 cycles (DIN EN 60068-2-14 method Na)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humid storage</td>
<td>85°C, 85% rel. humidity, 1,000 h according to Telcordia GR-1221-CORE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UV-stability</td>
<td>20 mW/cm² at 60 h irradiation without any degradation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical resistance</td>
<td>colorPol® polarizers are insensitive to most organic and cleaning solvents, acids and bases⁵ and distilled water.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

colorPol® polarizers follow completely the international RoHS, REACH and PFOS regulations.

¹ laminated, ground and polished
² less tolerance available upon request
³ exceeding this angle may lower contrast and transmittance
⁴ AR-coating may limit this angle
⁵ RI for other wavelengths on request
⁶ other quality grades available on request
⁷ other specifications available on request
⁸ AR-coating may limit the resistivity

CODIXX AG reserves the right to change technical information without notice.
About CODIXX

CODIXX AG is a corporation under German Law, established in September 1998. After a period of research and development CODIXX started the production of a new family of dichroic glass polarizers in 2002. The manufacturing plant is located in Barleben near Magdeburg. Since the end of 2002 the company is dedicated to development, production and marketing of dichroic glass polarizers, distributed worldwide under the trade name colorPol®.

Based on an unique technology for production and treatment of nanoparticles in glass, CODIXX manufactures high-quality polarizers for ultraviolet, visible and infrared spectral range.

An excellent flexibility of the colorPol® technology allows for the production of customized polarizers meeting demands for all spectral ranges, contrast conditions and designs.

CODIXX follows the Quality Management System DIN EN ISO 9001:2015 to guarantee the highest quality standard. The QMS was certified by TÜV Nord CERT in August 2003. In August 2018 the company was certified according the new DIN EN ISO 9001:2015, which is now valid until 2021.

colorPol® polarizers completely follow the international regulations of RoHS, REACH and PFOS.

CODIXX is recognized and certified as an apprenticing cooperation by the Chamber of Industry and Commerce (IHK) Magdeburg.

Trade shows

colorPol® polarizers are presented regularly by CODIXX at the following trade shows. Details are available at www.codixx.de

USA
- OFC
- Photonics West
- MD&M West

China
- Laser World of Photonics China
- CIOE

Japan
- OPIE
- Photonix

Germany/Europe
- Laser World of Photonics Munich
- Optatec
- Sensor+Test
- Compamed
- ECOC
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- Photonics West
- CIOE
- Photonix
- Optatec
- MD&M West
- Sensor+Test
- Compamed
- ECOC

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eMail: sales@foctek.com

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eMail: info@crisel-instruments.it

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eMail: colorPol@codixx.de