

## Laser protection for industry and research



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**uvex safety + uvex sports.  
One brand. One mission.**



## protecting people

As an integral part of the uvex group we are committed to the uvex quality promise with the best possible care and responsibility.

For us, **protecting people** means not only the fulfillment of norms and standards but also the expectations of our customers with regard to services, processes and the latest product technologies.

The transfer of know-how between laservision, uvex safety and uvex sports makes our products even safer more functional and comfortable.

## Welcome to laservision

**protecting people** is the claim and DNA of the uvex group.

We at laservision, as an integral part of uvex, have been protecting one of the most sensitive human organs – the eye – from laser radiation for four decades with commitment, customer orientation and innovative strength. For us, the focus is on people.

We have an international, highly qualified network of strategic partners and are committed to CO<sub>2</sub>-neutral growth in the long term. Our ambitious targets for production facilities and products ensure that **Made in laservision** is the right choice for our customers, today and in the future, a quality promise with added value.

The laservision brand is our future, the goal is the winner's podium.

**Our work is guided  
by our three brand values:**



- Since 1987, laservision has been synonymous with the highest standards of quality
- Measurement, technology and development competence
- Certified in acc. with ISO 9001 to the full extent
- laservision stands for reliability, precision and long-lasting products

- Our customers' requirements are the benchmark
- Customer-specific system solutions for laser protection
- Worldwide customer support by our premium partners network
- Sales offices across Germany
- Global distribution partners

- Expansion of our innovative strength through comprehensive know-how
- Digital transformation and active concepts such as Laser protection 4.0 and VR seminars

The protection of human health is our focus  
**protecting people** is our mission!

Committed to the safety of all users of laser technology in industry and research, laservision has been successfully developing and producing laser safety products for almost four decades.

Laser energy and focusability represent a special challenge for eye protection against laser radiation, because even a short, accidental glance into the beam can completely destroy the retina and can result in blindness.

With ever shorter pulse lengths, this means for the **laser safety eyewear** product range to have the broadest and highest possible certification with M protection levels - a development task to which we committed ourselves intensively since 2009.



Together with our partners, detailed tests were carried out on the blocking effect of glass, coated and plastic filters against ultrashort pulses of various wavelengths and the results were integrated into products - true to the uvex-wide claim **protecting people**.

We have been following the second trend towards shorter wavelengths in industry for years and have responded to this with a family of bright, broadband PC-based laser safety windows (P1P16, P1P20 and P1P21).

In this way, our own product development and manufacturing expertise together with our carefully selected partner network is continuously ensuring the improvement of our innovative protection products in the future.

## Made in uvex = Made in laservision

Sustainability at uvex includes the topics of ecology, economy, working conditions and human rights, employees and society, as well as products. A particular focus area is the expansion and modernisation of production facilities owned by uvex. When customers choose a uvex or laservision product, they are choosing the **Made in uvex** or **Made in laservision** principle.

This means that the focus is on our own production facilities as well as on long-term cooperation with strategic partners, many of them are based in Germany and Europe. The entire value chain is thus in our own hands or is significantly determined from us – from product idea and development through manufacturing, to sales.

”

For almost four decades we have been developing, producing and distributing high-quality laser safety products for the protection of people, true to the uvex-wide claim **protecting people**.

The entire laservision team is facing up to this responsibility for your safety every day.

**protecting planet by creating durable products** is part of our corporate responsibility and we emphasize sustainability throughout the value chain.

**Dirk Breitenberger**  
Manager of laservision –  
a uvex group brand

“



**protecting planet**

**by creating durable products**

## uvex and laservision are committed to CO<sub>2</sub>-neutral growth

One of the companies' most ambitious targets relates to CO<sub>2</sub> emissions – to achieve CO<sub>2</sub>-neutral growth over the next few years. The fact that the **uvex safety group**, including laservision as a part of it, has already been able to reduce its CO<sub>2</sub> emissions by almost a quarter in recent years shows that achieving this objective is not just a vision for the future.

## protecting planet by creating durable products

This is achieved by the refrain from offering disposable products and incorporating a maintenance and repair concept for laser safety eyewear right from the design phase.

This means that if a product becomes damaged, a regular service can be offered to repair the product and check its laser safety, significantly extending the product lifetime.



**protecting people –**  
The mission, responsibility and commitment of the uvex group



For more information, please refer to the **uvex group's sustainability report**, which has been prepared in accordance with **GRI standards**.



## Awarded.

In innovation and design.

As a 100% subsidiary of the uvex safety group, the laservision brand has an excellent reputation worldwide. Innovation is an important part of our DNA. Our aim is to be an innovation leader! Recent awards give us the motivation to continue on this way.

## German Design Award Special

in the category "Excellent Product Design – Industry"



### The E25 modular barrier system

- Proven Flex Joint hinge system
- Blocking light and laser beams at any angle (0–360°)
- Ready-to-use system
- Quick laser enclosure
- Space-saving storage



## German Innovation Award Winner

for the F46 laser safety glasses with Clipnetic System (GIA2021-11008) in the category #W2 Excellence in Business to Business – Medical Technologies



**Clipnetic fastener**  
for use as overspecs (OTG)



**Clipnetic flex nose**  
for use as lightweight glasses



**Clipnetic RX insert**  
for prescription glasses



Over 50 years of lasers in industry – means: working with the energy and power of a very special light, gentle on materials, without the need to change tools, in countless applications and with maximum precision. Perfect beam quality and tailored energy or power density distributions, at new wavelengths, make lasers the most important tool in photonics – one of the key technologies of the 21st century.

To achieve these goals, we protect your eyes in all product ranges reliably and with the highest quality – protecting people – 24/7/365.



The two major topics of current developments in the laser field are:

### Blue and green laser radiation

Pushed by the megatrends of electromobility and battery technology, more and more research and development is being carried out with and at laser sources with shorter wavelength. Responsible for this are the demands for lightweight construction, e.g. for the bodywork, as well as for the bonding of a wide range of different materials, such as copper and aluminum, which cannot be processed well with conventional fiber lasers due to their poor absorption properties.

With our new P1P18, P1P20 and P1P21 filters, we now provide protection not only in the IR range, but also in the blue spectral range, both in the form of windows and eyewear – with excellent daylight transmission and high levels of protection.

### Ultra short pulsed laser

Material-friendly micromaterial processing and the creation of ultra-fine structures by pico- and femtosecond lasers is already standard. Stable operation and simple handling increasingly enable their use in series production, such as for surface structuring or the cutting of glass, e.g. for cell phones. Some materials, such as special ceramics, can only be processed efficiently with USP lasers.

Microdrilling in photovoltaics, LED lights and energy efficiency by reducing frictional losses are key growth areas for the use of USP lasers and the fight against climate change. However, new materials and compounds require specialized sources with new wavelengths and adequate laser protection with M protection levels so that the **protecting people** principle applies here too.

You will find the ideal laser protection for all these applications and lasers in this catalogue!



## Laser safety eyewear

Core and origin of laservision are laser safety goggles with glass filters.

**protecting people** means here the careful spectral testing, the combination of different filters with our own laminator and the edging of the glass filters – **100% Made in laservision** with a repair guarantee of at least 10 years also particularly durable – Sustainability **Made in laservision**.

For laser safety glasses made of plastic we rely on the know-how and competence of uvex and manufacture in one of the world's most modern plants for eye protection products – **Made in uvex**.

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## Laser safety windows

Laser safety windows are available for all laser wavelengths. Depending on the material used (glass, PMMA, PC) a vertical integration with most modern processing methods like glass lamination, water jet cutting, CNC milling and automatic bonding allows us the production with highest quality and precision.

For particularly high laser powers or for unattended, automatic operation laservision offers a patented active laser safety window. **Made in laservision** is a quality label that users can rely on.

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## Large-area laser protection

Large-area laser protection is becoming increasingly important and our products from this range are as diverse as the applications. Aligned to this protection, flexibility and quality are the benchmark for our award-winning E25 foldable barrier system and its table-top version TTS – with an extra bit of functionality.

With our family of modular laser safety curtains of different thicknesses we protect your working area temporarily or permanently, on a rail system, frame or as a free-standing roll-up – standard-compliant and freely configurable, whereas qualified partners from our network take care for the assembly and installation of our innovative lamella curtains and laser protection roller blinds.

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Only when a product fulfils all the requirements  
of the applicable standards  
**does it deserve the name uvex.**



**For our plastic eyewear, we rely on the know-how and expertise of uvex.**

Whether it's spectacles, goggles, prescription glasses or laser safety eyewear: In the Bavarian town of Fürth, uvex develops and manufactures innovative safety eyewear that meets the highest quality standards.

The factory, certified according to ISO 9001: 2015 and ISO 50001: 2011, relies on the latest technology and close cooperation with strategic partners – the best basis for the development of pioneering technologies.

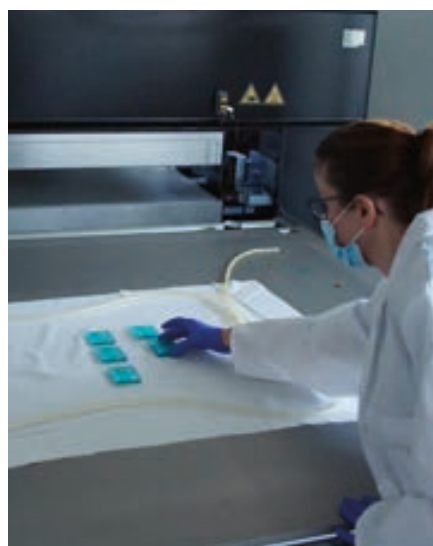
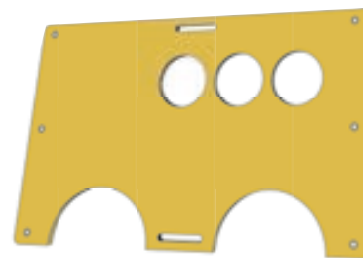


## CNC milling

A large sheet warehouse, state-of-the-art handling systems and an ultra-modern flat bed milling machine guarantee the “ready-to-use” production of **plastic laser safety windows** and even enable design-optimised free form solutions to meet your design, construction and assembly requirements.

### Processing options:

- Rectangular and free form processing up to dimensions of 3 × 2m
- Contour accuracy  $\pm 0.05\text{mm}$
- Material thickness  $\geq 1\text{mm} - 150\text{mm}$
- Drill hole diameter  $\geq 3\text{mm}$
- Thread  $\geq \text{M3}$
- Counterbores, oblong holes and grooves
- Chamfered and polished outer edges



## Glass laminate

- In-house production
- Customer-specific single-item production and series production
- Higher optical densities thanks to additional PVD coating
- Lamination of windows and glass filters (mineral glass and plastic)
- Autoclave process with composite film or adhesion

## Water jet cutter

- In-house precision cutting of all laser protection materials
- Customer-specific free form cutting with maximum contour accuracy
- Maximum nesting density, therefore excellent use of material
- The cut creates no material tension – thus no cracking or deformation of the material
- High and uniform cutting quality



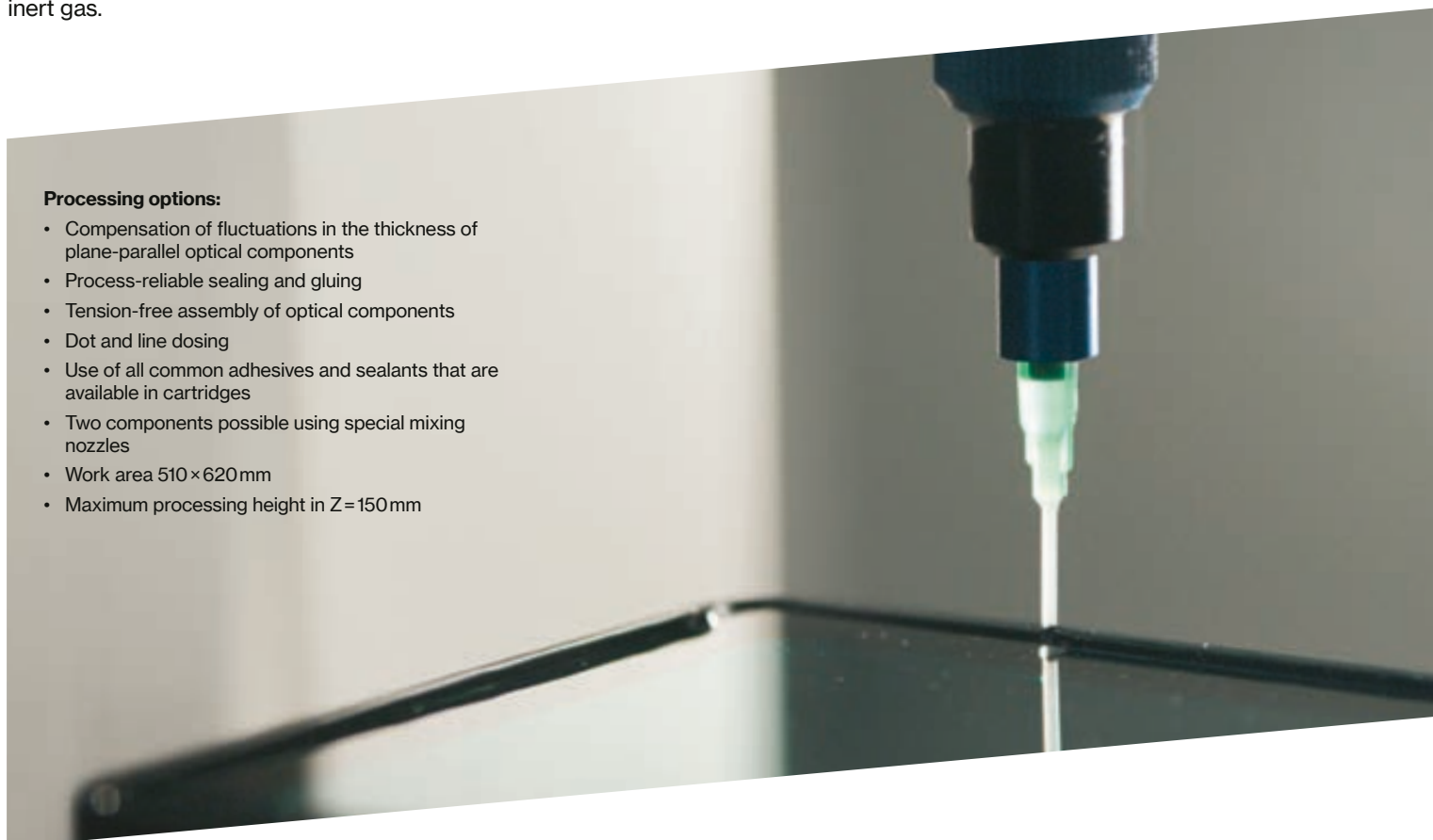
### 3-axis bonding robot

Especially in industrial laser systems, optical components and laser safety windows must be mounted stable, reliable and perfectly matched to the requirements of the process. In other applications, i.e. the working space must be sealed, despite of optical components in the chamber wall, to minimize the loss of inert gas.

In all cases where mechanical clamping is not sufficient, laservision offers with the **3-axis bonding robot** an alternative option for joining optical components e.g. to an aluminum frame and thus ensuring a stable and tension-free assembly.

#### Processing options:

- Compensation of fluctuations in the thickness of plane-parallel optical components
- Process-reliable sealing and gluing
- Tension-free assembly of optical components
- Dot and line dosing
- Use of all common adhesives and sealants that are available in cartridges
- Two components possible using special mixing nozzles
- Work area 510 × 620 mm
- Maximum processing height in Z = 150 mm

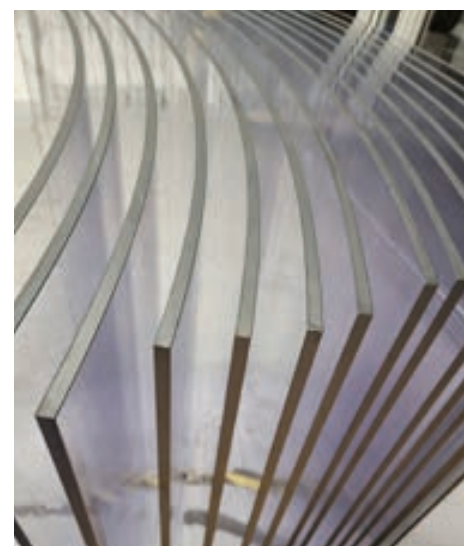


### Laser safety windows in any form

Laser safety windows made out of plastic are much easier to process than those made of mineral glass. We take advantage of this fact and bring laser safety windows into almost any desired shape.

#### Your benefits at a glance

- Optimum flexibility when designing the area concerned
- Innovative laser technology supported by innovative machine design
- Transparent and laser-safe enclosures at trade fairs
- Reverse Printing and laser marking possible
- Distortion-free bending
- Anti-scratch coating
- Precise edges and holes thanks to post-processing at state-of-the-art milling centre



# Spectacle frames



Within the area of application of European laser safety standards EN 207 and EN 208, laser safety eyewear must meet a range of requirements. The two most important functions are laser resistance and the attenuation of laser beams.

The laser resistance is determined for each required laser operating mode (D, I, R, M) by means of direct hit testing, and the appropriate LB rating then assigned. The laser parameters are selected in this process in accordance with the rating that is to be assigned. The safety spectacles must withstand at least 5 s or, in the case of pulse lasers, at least 50 pulses of laser radiation without losing their protective function.

The attenuation measurement is called the optical density (OD). This measurement, which does not have a unit, gives the attenuation to the power of 10. For example, OD1 indicates 10-fold attenuation and OD3 indicates 1000-fold attenuation.

The frame of the laser safety glasses must also prevent laser beams from entering from the sides (coverage area).

Since the frame often provides side protection, both tests (OD and laser resistance) are performed for the laser safety filter and the frame. Whichever partial result is lower determines the protection level of the eyewear for the respective operating mode and wavelength.

To take advantage of the high level of protection offered by mineral glass filters, plastic frames are reinforced with metal.

All requirements are evaluated by an independent certification (Notified) Body as part of the EC type examination. The laser resistance of the eyewear is then certified with an LB rating in the EC type approval certificate (CE). This marking must be permanently and legibly marked directly on the laser safety eyewear.

The appropriate frames for high-quality laser protection from laservision are listed on the following pages.

**laservision frames  
for laser safety eyewear**  
These are available on our  
website:



## R01 Spectacle for small, flat filters

- Small spectacles that can also be used with a headband
- Low weight
- Multi-way adjustable Duoflex comfort arms
- Internal metal reinforcement for high level of protection
- Can be worn with RX insert (in-house lens service)
- Optionally available with head support



Internal metal reinforcement for high level of protection



Further information on this frame is provided on our website.



Optionally also available with head support A01HSUBS1000



Optionally also with headband



Optionally with RX insert for prescription glasses

Further information on **laservision's in-house lens service** is available on the website.



## R02 Spectacle for curved glass filters

- For filters with base curve 6 for excellent field of view
- For absorbing and coated glass filters
- Highest protection levels, e.g. DIR LB9 315-1400 nm
- Reinforced frame with internal lamination
- Multi-way adjustable Duoflex arms
- Optionally available with headband or head support



Internal metal reinforcement for high level of protection



Multiple side arm inclinations for a guaranteed perfect fit



Length-adjustable Duoflex comfort arms



Optionally also with headband A10STRAP1LVO



Excellent field of view thanks to base curve 6

Further information on this frame is provided on our website.



Included	Art. number
Headband	A10STRAP1LVO
Alu-box for safe storage of R01/R10/R17	A10MTBOX1000
Cord for wearing around the neck	A99CORDW1000
Instruction manual	

# Frames for glass filters

## R10

### Overspecs with a large field of view

- Filter with base curve 2 for a large field of view
- Absorbing and coated glass filters
- Multi-way adjustable Duoflex arms
- Headband available as optional accessory
- External metal reinforcement for high level of protection
- Particularly suitable for spectacle wearers
- Optionally available with head support



Further information on this frame is provided on our website.



Filter with base curve 2 for a large field of view



External metal reinforcement for high level of protection



Optionally also with headband A10STRAP1LVO

## R17

### Spectacles with RX insert for flat filters

- Frame for flat filters and filter combinations up to 12mm thickness
- Protection levels up to D LB8/IRM LB9 315–1400 nm
- RX insert can be fitted for prescription lenses (in-house lens service)
- Multi-way adjustable Duoflex arms as standard
- External reinforcement in blue
- Options: headband and head support



External metal reinforcement for high level of protection



Multiple side arm inclinations for a guaranteed perfect fit



Length-adjustable Duoflex comfort arms



RX insert can be fitted for prescription lenses as an option



Optionally also available with head support A01HSUPS1000



Further information on this frame is provided on our website.

#### Accessories for R01/R10/R17 frames

Description	Art. no.
Headband set for R01, R02, R10, R17	A10STRAP1LVO
RX insert for R01 and R17 frame	A01RXINS1000
Anti-fog insert for R10	A10RAFOG1000
Head support for R01, R10, R17 frame	A01HSUPS1000

## R14

### Reinforced goggles for flat filters as overspecs

- Absorbing and coated flat glass or custom filters
- Adjustable wide headband
- A head support system can also be fitted as an option
- Reinforced frame with internal lamination
- Suitable for spectacle wearers (OTG/goggles)
- Optional anti-fog insert
- Easily changeable cushion frames (sealing lip, foam or vented) available as standard

Further information on this frame is provided on our website.



Internal reinforcement



Three different cushion frames: Foam, sealing lip, vented



Adjustable wide headband (A14STRAP1LV0)



Optional: Anti-fog insert A14RAFOG:1000 for a clear view



Optionally also available with head support A14HSUBS1000



Reinforced frame for high protection

#### Accessories for the R14 frame

Description	Art. no.
Anti-fog insert for a clear view	A14RAFOG1000
Wide headband with adjustment mechanism for a secure, comfortable fit	A14STRAP1LV0
Set of 5 cushion frames – vented soft foam	A14AIREP1000
Set of 5 cushion frames – soft foam	A14FORUB1000
Set of 5 cushion frames – sealing lip	A14LIPSE1000
Alu-box for safe storage of R14	A14MTBOX1000

**Cleaning and disinfection:** Further information on how to clean and disinfect laservision safety spectacles can be found on page 23.

## F46

### The multitalent with Clipnetic System



With a highly functional overspecs frame design, the F46 is a truly universal piece of safety eyewear. Thanks to the Clipnetic System, the nose bridge can be swapped out for the RX insert or Clipnetic cover quickly and easily – which means that the spectacles can be worn by different people, producing huge cost savings. The cold-formable temple ends guarantee a comfortable and secure fit. The F46 frame is compatible with glass and plastic laser safety filters with base curve 6.



**The Clipnetic System**  
makes it quick and easy to swap out the cover, nose piece and RX insert – without tools



**Clipnetic RX insert**  
for prescription lenses  
(in-house glazing service)



**Clipnetic Flex nose**  
Soft, adjustable and slip-resistant



Base curve 6 laser safety filters available in glass and plastic



**Optimised eye coverage**  
Enhanced protection thanks to enlarged side edges  
**Special plastic**  
with high laser resistance



**Anti-slip rubber**  
for a secure fit  
**Flexible, cold-formable temple ends**  
for a comfortable fit



Further information on this frame is provided on our website.

**Cleaning and disinfection:** Further information on how to clean and disinfect laservision safety spectacles can be found on page 23.





**The magnetic F46  
Clipnetic System:**

**1**

**Clipnetic cover**

The orange fastener is designed to protect the magnetic insert. This version can be worn as overspecs (OTG).



**2**

**Clipnetic RX insert  
(A46.RXINS1001)**

For prescription lenses of the appropriate strength.



**3**

**Clipnetic Flex nose piece  
(A46CNOSE1001)**

for even greater wearing comfort and a custom fit for any nose shape.



Available to order separately	
Adjustable, soft Clipnetic Flex nose piece	<b>A46CNOSE1001</b>
RX insert	<b>A46RXINS1001</b>
Clipnetic cover	<b>A46COVER1000</b>

Included	Art. number
Softbox (black) with zip for spectacles with plastic laser safety filter	<b>A99HCASE1000</b>
or	
Alu-box (silver) for spectacles with glass laser safety filters each incl. Clipnetic cover, RX insert and Flex nose piece	<b>A14MTBOX1000</b>
Cord for wearing around the neck	<b>A99CORDB1003</b>

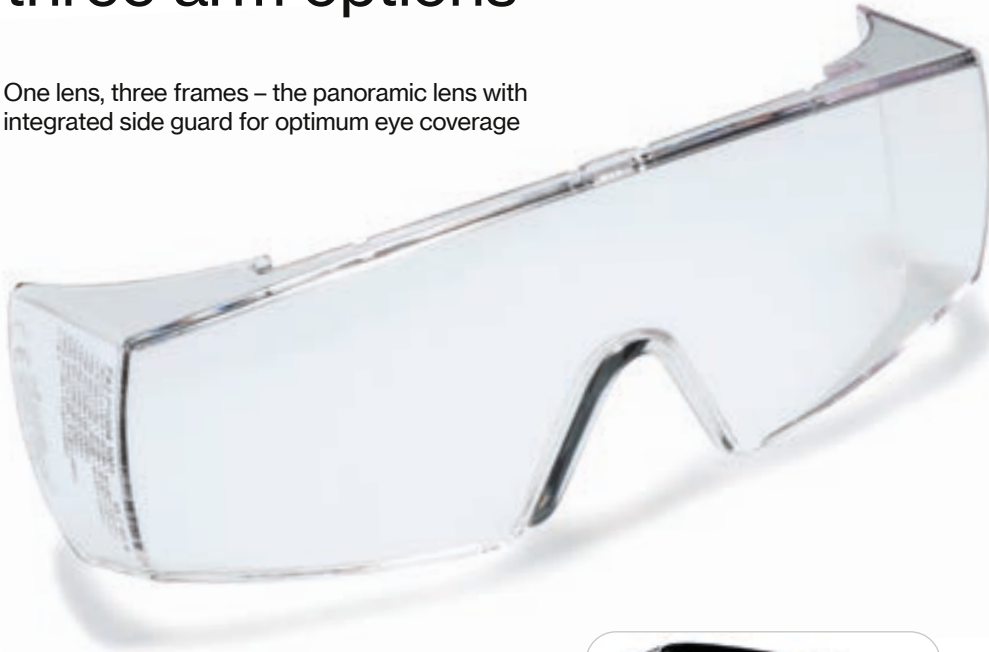


Further information on **laservision's in-house glazing service** is available on the website.

## Overspecs (OTG) frames for spectacle wearers

### One panoramic lens – three arm options

One lens, three frames – the panoramic lens with integrated side guard for optimum eye coverage



Very low weight for high levels of wearer acceptance.



Optimum eye coverage thanks to integrated side guard.



Suitable for almost all modern prescription spectacles thanks to rectangular shape, flat geometry and virtually straight sides.



The panoramic lens is compatible with all plastic laser safety filters.

### F18 The lightest overspecs with flexible arms

The F18 frame with hingeless flexible arms boasts an innovative arm design that delivers exceptional comfort and high mechanical stability.



Replaceable hingeless arms with high mechanical stability.



Highly flexible temple ends for maximum wearer comfort.

Further information on this frame is provided on our website.



**Tip:**  
Users of F18/F22 models can switch to the F42 and benefit from its enhanced comfort by replacing the arms on their spectacles.

## F42 Overspecs with quick release

The innovative quick release arm system allows users to change their frame as needed – without tools and without risking cracks to the lens. The foldable arms are made from a disinfectable material promise significantly enhanced ergonomics and fit thanks to the cold-formable temple ends.



Cold-formable for enhanced wearer comfort and optimum fit.



Innovative quick release system for greater flexibility.

## F22 The lightest overspecs with foldable arms

The F22 frame boasts an innovative arm design that delivers exceptional comfort and high mechanical stability.



Further information on this frame is provided on our website.



Arm design with high mechanical stability.



Temple ends with anti-slip function.



Further information on this frame is provided on our website.

**Included with delivery of F18/F22/F42:**



**Cord for wearing around the neck**  
Art. number: A99CORDW1000



**Softbox (black) with zip**  
Art. number: A99HCASE1000

## Sporty frames

### F20

#### The sporty and elegant spectacles

The F20 frame is lightweight but also robust. Fitted with a soft nose piece and integrated side guard, the spectacles create an effective seal around the cheeks and eyebrows. The cold-formable arms mean that the spectacles can easily be adjusted to fit any facial shape. The base curve 6 filters guarantee a good field of view combined with a fashionable look.

Further information on this frame



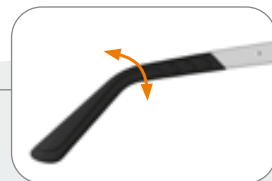
Included in delivery F20	Art. number
Softbox (black) for safe storage	A99HCASE1000
Cord for wearing around the neck	A99CORDW1000
Instruction manual	

Very good all-round view thanks to close fit



**Comfortable fit**  
Soft nose cushion for high wearer comfort

Wide arms with integrated side guards



**Flexible temple ends**  
Cold-formable, flexible temple ends for a comfortable fit



**Good field of view**  
Absorbing base curve 6 glass and plastic filters

### F29

#### The sporty and trendy spectacles

The innovative F29 frame sets new benchmarks in terms of fit and wearing comfort. The flexible arms with multiple inclinations can be individually adjusted, while the integrated Softflex zone guarantees exceptional wearing comfort and a secure fit on different head sizes. The soft adjustable nose piece ensures a pressure-free fit.



**Multiple side arm inclinations**  
Reliable protection thanks to perfect fit



**Adjustable nose piece**  
Slip-resistant pressure-free fit



**Arm flex zone**  
Soft and flexible temple ends provide a secure fit for both narrower and wider head shapes.

Included in delivery F29	Art. number
Softbox (black) for safe storage	A99HCASE1000
Cord for wearing around the neck	A99CORDW1000
Instruction manual	

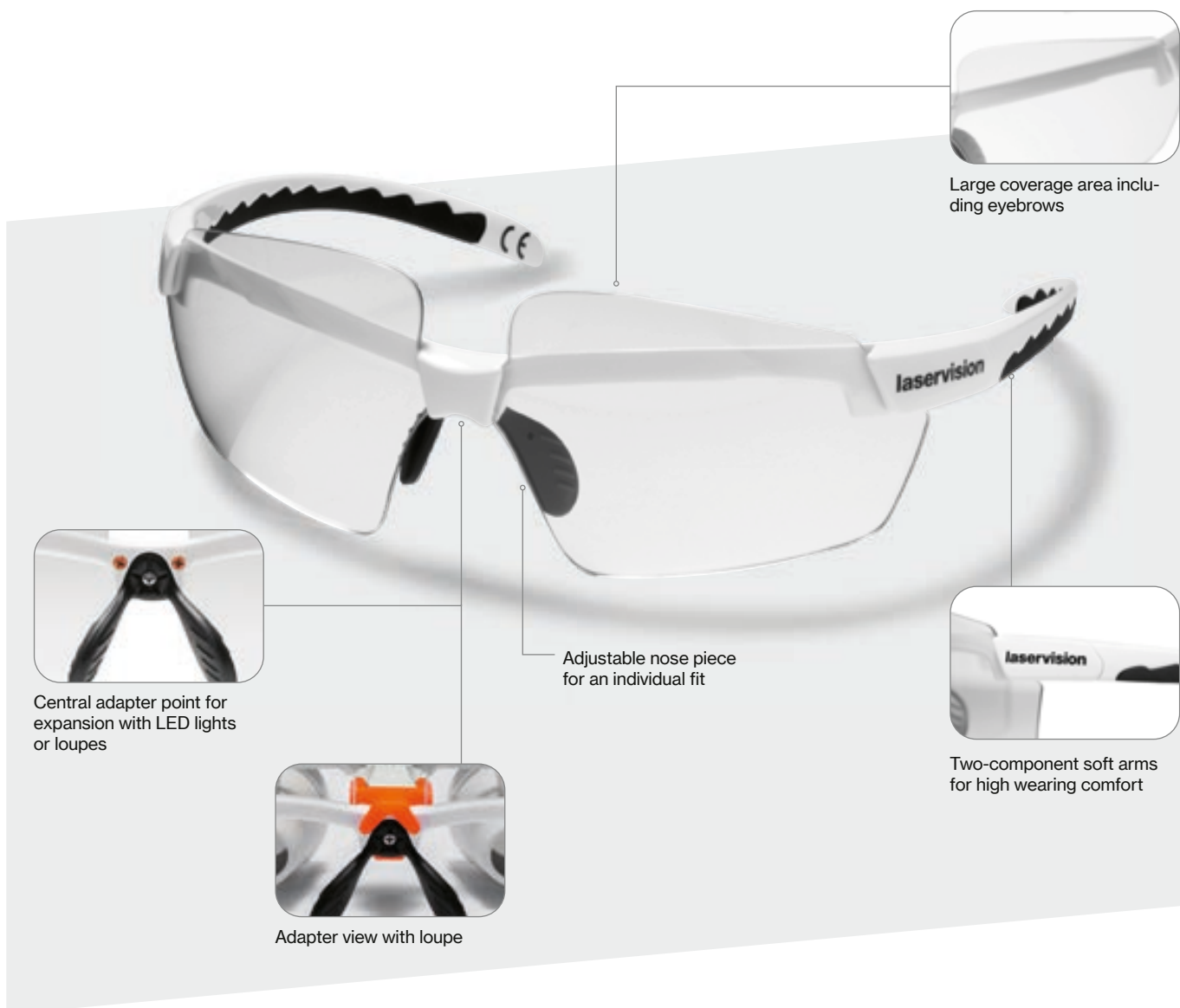
Further information on this frame is provided on our website.



# F47

## The light, sporty frame with LED or loupe

- Dual base curve 8 plastic lens spectacles
- Large coverage area including eyebrows thanks to filter height
- Field of view not restricted by frame
- Minimal weight (approx. 25 g with filter)
- Expansion options (symmetrical weight distribution)



### Optional expansion options:



Adapter with pre-installed loupe  
Art. number: A47.LOUPE.xxxx



Adapter with LED  
Art. number: A47.LIGHT.1000

Further information on this frame is provided on our website.



The optional accessories can be ordered separately.

# Laser Safety Eyewear



Light – or defined wavelengths – can be blocked out of the spectrum using absorbent materials or reflection. Laser safety eyewear using these types of filter are the main part of our product portfolio. laservision has many years of technological experience in all relevant areas. Our internal quality management guarantees compliance with all applicable guidelines and standards, while regular recertification by independent institutions ensures that we are continuously improving our practices and consistently adhering to all relevant standards.

However, when selecting a filter, the colour view through the filter is also an important consideration. It is essential to take into account that some colours may no longer be recognisable through this filter – and this effect also affects warning lights or displays.

In this catalogue, we therefore use the innovative and intuitive Colour Transmission Radar (CTR diagram) – a system developed by laservision based on the DIN EN 172 (Signal Light Detection) standard – to indicate which colours can be seen through each of the laser safety filters.

This standard defines the required minimum transmission value for signal light detection – depending on the visible light transmission (VLT) of the filter – for each of the four basic colours (red, green, blue and yellow). This limit is represented in the CTR diagram by the red dashed line.

**Suitable laser safety filters are listed on page 28 onwards.**

laservision  
laser safety eyewear  
These are available on our  
website:



## Cleaning and disinfection instructions for laser safety eyewear

As at: 26/11/2020

**When cleaning and disinfecting laservision eyewear, the following generally applies in accordance with the instructions for use:**

1. Do not clean when dry (dry grinding effect) – laservision recommends using running water and laservision cleaning fluid.
2. **laservision recommends using an alcohol-based disinfectant.**
3. laservision recommends wipe disinfection. If it is absolutely necessary to use a spray, it is important to ensure that no disinfectant residue is left on the frame or lens.
4. Under no circumstances should laser safety eyewear be autoclaved or placed in disinfection solutions or ultrasonic baths.
5. Failure to follow the cleaning and disinfection instructions may significantly shorten the life of the product and mean that its safety cannot be guaranteed.

**Based on extensive internal tests using various disinfectants, we recommend the following products:**

Company/ manufacturer	Tissues	Fluid
Dr Deppe	Spray In QF	Spray In QF
Dr Schumacher	Descosept Sensitive Wipes	–
Dr Weigert	–	neodisher MED rapid
Schülke	Pursept A Xpress wipes	Pursept A Xpress
Schülke	Mikrozid AF wipes	Mikrozid AF liquid

Please make sure that you use only the recommended alcohol-based disinfectants. If this is not possible, use their formula as a guide.

No matter which disinfectant is used, it will have an impact on the eyewear, depending on the intensity and frequency of disinfection. This means that even using the recommended disinfectants may cause the paint to peel, depending on how frequently they are used. However, this will not impair the laser protection effect!

**Note: Disinfectants with the following ingredients have been found to be particularly damaging, so please do not use products containing these ingredients under any circumstances:**

- Aldehyde
- Amine
- Glutaral
- Peracetic acid
- Quaternary ammonium compounds (QAC)

## Cleaning station

The professional wall-mounted cleaning station A99.CLSTA.1300 includes a dispenser containing a cleaning fluid specially designed for use with laser safety filters, as well as wood-free tissues for cleaning.

This combination of products allows users to clean their eyewear gently and thoroughly, helping to guarantee a long lifetime for both the spectacles and the filters.



Included	Art. number
Cleaning station	A99.CLSTA.1300
Cleaning tissues (single pack)	A99.CLSTA.1302
Cleaning fluid	A99.CLSTA.1303
Spray pump	A99.CLSTA.1304

# Overview of full protection glass/coated filters for laser safety eyewear in accordance with EN 207

Page	Filter	Applications																	
		Cutting	Welding	Soldering	Marking	Cleaning	Additive manufacturing	Use with ultrashort pulse lasers	Telecommunications	CO <sub>2</sub> applications	Alignment protection	Special applications	Broadband lasers	OPOs	OPAs	Ti:Sa	Supercontinuum	Dye laser	Laser diodes
29	T1B09										•								
29	T1C02	•	•	•	•	•	•												•
30	T1D01	•	•	•	•	•	•		•		•								
30	T1E02	•	•	•	•	•	•												
31	T1E03	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•
31	T2H02										•								
NEW 32	T1H06	•	•	•	•	•	•												
32	T1K01	•	•	•	•	•	•												
33	T1K02	•	•	•	•	•	•												
33	T2K02	•	•	•	•	•	•		•										
34	T1K03	•	•	•	•	•	•	•		•									•
34	T1K04	•	•	•	•	•	•			•									•
35	T2K05								•										
35	T1K06	•	•	•	•	•	•	•		•									•
36	T1K15							•											
36	T2K15							•											
37	T1K17							•											
37	T1L01	•	•	•	•	•	•												
38	T1L02	•	•	•	•	•	•												
38	T1M01	•	•	•	•	•	•												
39	T1P01	•	•	•	•	•	•	•					•	•	•	•	•	•	•
39	T1P02							•					•	•	•	•	•	•	•
40	T1P04							•					•	•	•	•	•	•	•
40	T1P05	•	•	•	•	•	•	•		•			•	•	•	•	•	•	•
NEW 41	T1P07	•	•	•	•	•	•	•		•			•	•	•	•	•	•	•
41	T1Q01	•	•	•	•	•	•				•		•	•	•	•	•	•	•
42	T1Q02	•	•	•	•	•	•	•			•		•	•	•	•	•	•	•
42	T1Q03	•	•	•	•	•	•				•								
43	T2Q04	•	•	•	•	•	•												
43	T1Q05	•	•	•	•	•	•				•								
NEW 44	T1Q06							•					•	•	•	•	•	•	•



Wavelength range [nm]							
UV		Blue	Green	Red	NIR	IR	
180 – 315	315 – 400	400 – 700		700 – 1400	1400 – 3000	3000 – 11500	11500 – 25000
		400 – 670					
				750 – 1200			
						5400, 9000 – 11500	
180 – 532							
180 – 578							
			573 – 595, 735 – 756, 790 – 810				
			532, 700 – 800, 1064				
				647 – 1550		9000 – 11000	
					950 – 3000, 5400, 10600		
					850 – 11500		
					900 – 25000		
					1030 – 1100, 2000 – 2200, 5400, 9000 – 11000		
					850 – 25000		
					730 – 25000		
					780 – 11500		
					780 – 11500		
					745 – 25000		
180 – 535						1030 – 1100, 2000 – 2200, 5400, 9000 – 25000	
180 – 535						1030 – 1100, 2000 – 2200, 5400, 9000 – 25000	
180 – 532						808 – 11500	
180 – 535				750 – 1100		9000 – 25000	
180 – 532				620 – 2500		9000 – 11500	
180 – 535					620 – 25000		
180 – 535					730 – 25000		
180 – 540					730 – 25000		
					633, 690 – 1550, 10600		
				620 – 1580			
					630 – 635, 750 – 1100, >3000 – 25000		
				750 – 1100			
					650 – 25000		
				180 – 25000			

# Overview of full protection and adjustable plastic filters for laser safety eyewear in accordance with EN 207 und EN 208

Page	Filter	Applications																	
		Cutting	Welding	Soldering	Marking	Cleaning	Additive manufacturing	USP	Telecommunications	CO <sub>2</sub> applications	Alignment protection	Special applications	Broadband lasers	OPOs	OPAs	Ti:Sa	Supercontinuum	Dye laser	Laser diodes
46	P1B05										•								
46	P1B06										•	•							•
47	P1C02	•	•	•	•	•	•			•									
47	P1D01	•	•	•	•	•	•			•									
48	P1E01												•	•	•	•	•	•	•
48	P1E02												•	•	•	•	•	•	•
49	P1E03												•						•
49	P1E07										•								
50	P1F01											•							•
50	P1G04	•	•	•	•	•	•			•									
51	P1H02										•								
51	P1H03																		•
52	P1H06	•	•	•	•	•	•			•		•							•
52	P1L02	•	•	•	•	•	•	•		•		•	•	•	•	•	•	•	•
53	P1L07	•	•	•	•	•	•			•									•
53	P1L09	•	•	•	•	•	•			•	•								•
54	P1L10											•							•
54	P1L12	•	•	•	•	•	•	•		•	•		•	•	•	•	•	•	•
55	P1L13										•								
55	P1L15										•								
56	P1L16	•	•	•	•	•	•	•		•									•
56	P1M01								•										
57	P1P10										•								
57	P1P15										•								
58	P1P17	•	•	•	•	•	•												•
58	P1P18	•	•	•	•	•	•	•					•	•	•	•	•	•	•
59	P1P20	•	•	•	•	•	•												

## Key

Wavelength range	Characteristics
 Blocking effect in UV range 180 nm – 400 nm	 Filter with reflective coating
 Blocking effect in VIS range 400 nm – 700 nm	 Broadband filter
 Blocking effect in NIR range 700 nm – 3000 nm	 Alignment protection
 Blocking effect in IR range 3000 nm – 25000 nm	 M protection levels for ultrashort pulse lasers

Printing errors: Standards, product descriptions and technical specifications are subject to change.

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Wavelength range [nm]							
UV		Blue	Green	Red	NIR	IR	
180 – 315	315 – 400	400 – 700		700 – 1400	1400 – 3000	3000 – 11500	11500 – 25000
			595 – 685				
			540 – <655, 655 – 725				
				780 – 1100			
180 – 384							3950 – 25000
	180 – 550						
			585 – 605				
				630 – 710			
			180 – 455, 515 – 540, 625 – 666				
180 – 390				730 – 855			
180 – 400						5250 – 14000	
			625 – 820				
			540 – 870				
			532				
	180 – 540			780 – 1100			
			180 – 545, 630 – 1210				
180 – 460				650 – 1120			
180 – 532				800 – 1070			
180 – 445				705 – 1100			
180 – 545				620 – 674, 790 – 1090			
180 – 460				620 – 1090			
			180 – 535, 640 – 715, 808 – 1080				
180 – 400					780 – 11500		
180 – 400					635 – 11500		
			180 – 1400			5250 – 14000	
	180 – 545			785 – 1125		5250 – 14000	
185 – 475				780 – 1115		5250 – 14000	
180 – 490				735 – 1150			3945 – 25000

### Alignment protection in accordance with EN 208

		Blue	Green	Red
29	T1B09		400 – 670	
41	T1Q01			633
42	T1Q02			630–635
42	T1Q03			630–635
43	T1Q05			660
46	P1B05			610–650
46	P1B06		540–555	
49	P1E07		515–540	625–666
51	P1H02			625 – <660, 660 – 675
53	P1L09			650 – 680, 690 – 700
54	P1L12			630–650
55	P1L13		529 – 545, 631 – 644, 656 – 674	
55	P1L15			620 – 635, 650 – 665
56	P1P10			635 – 690
57	P1P15		410 – 700	

# Mineral Glass Laser Safety Eyewear



## Mineral glass laser safety eyewear with and without reflective coating and and customized CE certified solutions

When it comes to thermal stability, glass filters are far superior to their plastic counterparts, making them ideal for use in continuous wave lasers (cw) at medium to high levels of power. Absorbing laser safety mineral glass filters have a high level of resistance in this area.

Laser safety eyewear with absorbing mineral glass filters are the most widely used type of laser safety filter, particularly in industrial applications. Glass manufacturers offer a wide range of filters, which are cut and polished to different thicknesses depending on the required attenuation (optical density).

For IR applications in particular, we offer a range of powerful filters with a very good colour view. By combining different filters (for glass lamination see expertise page 10), we can create customer-specific safety eyewear with protection tailored to your application.

## Mineral glass filters with reflective coating

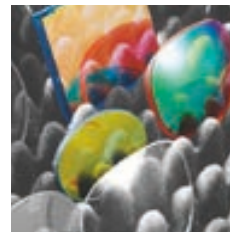


These mineral glass filters are created by applying a large number of interference layers in a vacuum (PVD coating).

This gives the filters a very high optical density. The blocking range of the reflective coating is determined solely by the layer design itself and reflects almost all of the laser light.

Combined with absorbing filters, there are virtually no limits when it comes to setting the blocking range.

## Customized CE certified mineral glass filters



From time to time, situations may arise – usually in research but sometimes also in industry, where it is not possible to cover all the wavelengths present with standard eyewear.

Thanks to many years of experience in the measurement and processing of glass filters, we are able to develop and

manufacture customer-specific solutions by combining different filter materials and to have single pairs of eyewear approved with a CE certificate.



**Laser safety filters  
made of absorbing  
mineral glass**  
These are available on our  
website:



**Laser safety filters with a  
reflective coating**  
These are available on our  
website:

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1B09



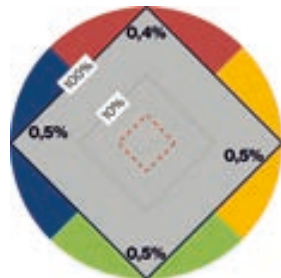
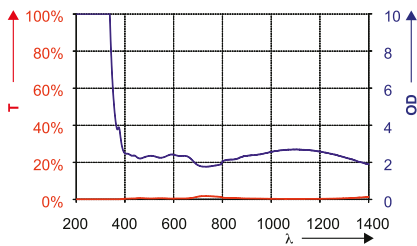
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Alignment Protection  
**VLT (approx.):** 1%

### Typical Lasers

Diodes

### Transmission-/OD Curve



### Protection levels

Frame Art.No. ...T1B09	400 - 670 nm
OD	2-3
R01	0,1W 2x10-5J RB2
R14	0,1W 2x10-5J RB2
R17	0,1W 2x10-5J RB2

## Filter T1C02



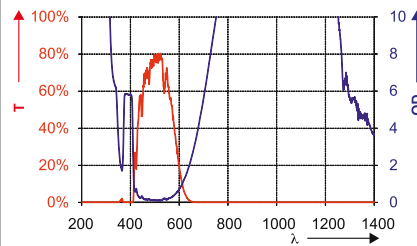
### Filter Properties

**Filter Material:** Coated Mineral Glass  
**Filter Technology:** Reflexion-/Absorption Filter  
**VLT (approx.):** 50%

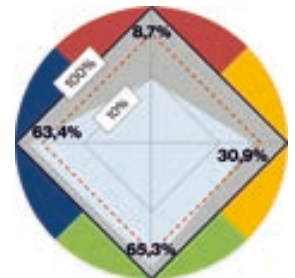
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 USP

### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T1C02	750 - <808 nm	808 - <960 nm	960 - <1025 nm	1025 - <1064 nm	>1064 - <1100 nm	>1100 - <1200 nm
OD	8+	10+	10+	10+	9+	8+
R01	D LB7 I LB8 R LB8 M LB8	D LB7 I LB8 R LB8 M LB8	D LB8 I LB8 R LB8 M LB8	D LB8 I LB9 R LB9 M LB9Y	D LB8 I LB9 R LB9 M LB8	D LB7 I LB8 R LB8 M LB8
R14	D LB7 I LB8 R LB8 M LB8	D LB7 I LB8 R LB8 M LB8	D LB8 I LB8 R LB8 M LB8	D LB8 I LB9 R LB9 M LB9Y	D LB8 I LB9 R LB9 M LB8	D LB7 I LB8 R LB8 M LB8
R17	D LB7 I LB8 R LB8 M LB8	D LB7 I LB8 R LB8 M LB8	D LB8 I LB8 R LB8 M LB8	D LB8 I LB9 R LB9 M LB9Y	D LB8 I LB9 R LB8 M LB8	D LB7 I LB8 R LB8 M LB8

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1D01



### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 90 %

### Typical Lasers

CO<sub>2</sub>  
 USP

## Filter T1E02



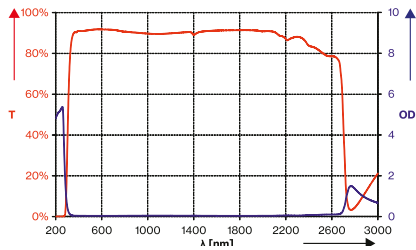
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 40 %

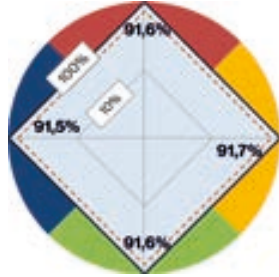
### Typical Lasers

SHG  
 THG  
 FHG

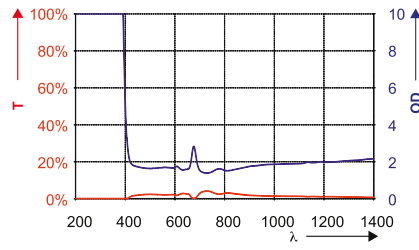
### Transmission-/OD Curve



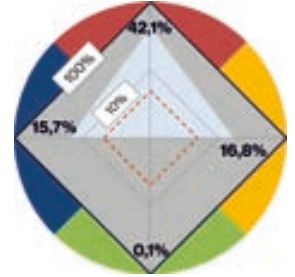
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... T1D01	5400 nm	9000 - 11500 nm
OD	5+	10+
R01	D LB5 I LB5Y R LB2	D LB5 I LB5Y R LB2
R14	D LB5 I LB5Y R LB2	D LB5 I LB5Y R LB2
R17	D LB5 I LB5 R LB2	D LB5 I LB5 R LB2
F20	D LB5 I LB4 R LB2	D LB5 I LB4 R LB2
R02	D LB4 I LB4Y R LB2	D LB4 I LB4Y R LB2

### Protection levels

Frame Art.No. ... T1E02	180 - 315 nm	>315 - 532 nm
OD	10+	8+
R01	D LB10 I LB5 R LB5 M LB5Y	D LB7 I LB8 R LB8 M LB8Y
R14	D LB10 I LB5 R LB5 M LB5Y	D LB7 I LB8 R LB8 M LB8Y
R17	D LB10 I LB5 R LB5 M LB5Y	D LB7 I LB8 R LB8 M LB8Y

## Filter T1E03



### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 5%

### Typical Lasers

SHG  
 Ti:Sa, OPOs, OPAs  
 USP

## Filter T2H02



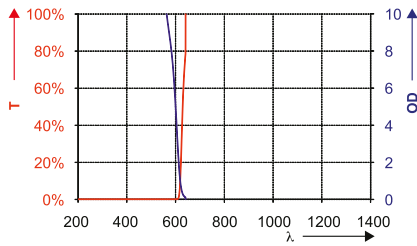
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 16%

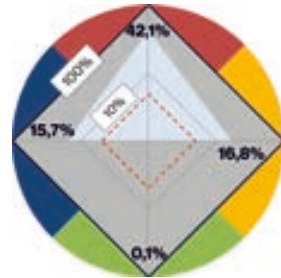
### Typical Lasers

Diodes

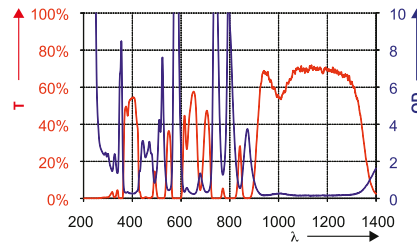
### Transmission-/OD Curve



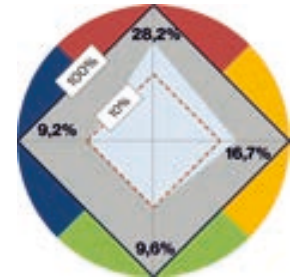
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T1E03	180 -315 nm	>315 -515 nm	>515 -578 nm	
OD	9+	8+	7+	
R01	D LB9 I LB5 R LB5 M LB6Y	D LB6 I LB8 R LB8 M LB7Y	D LB6 I LB7 R LB7 M LB7Y	
R14	D LB9 I LB5 R LB5 M LB6Y	D LB6 I LB8 R LB8 M LB7Y	D LB6 I LB7 R LB7 M LB7Y	
R17	D LB9 I LB5 R LB5 M LB6Y	D LB6 I LB8 R LB8 M LB7Y	D LB6 I LB7 R LB7 M LB7Y	

### Protection levels

Frame Art.No. ...T2H02	573 -595 nm	735 -756 nm	790 -810 nm	800 nm	
OD	5+	5+	4+	5+	
R01	D LB5 I LB5	D LB5 I LB5	D LB4 I LB4	D LB5 I LB5	
R14	D LB5 I LB5	D LB5 I LB5	D LB4 I LB4	D LB5 I LB5	

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1H06



### Filter Properties

**Filter Material:** Coated Mineral Glass  
**Filter Technology:** Reflexion-/Absorption Filter  
**VLT (approx.):** 25%

### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 SHG  
 Diodes  
 USP

## Filter T1K01



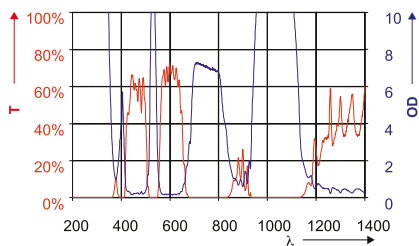
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 45%

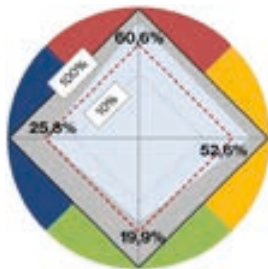
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 CO<sub>2</sub>  
 USP

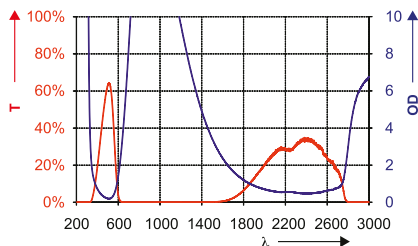
### Transmission-/OD Curve



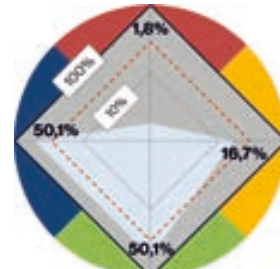
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... T1H06	532 nm	700 - 800 nm	1064 nm
OD	10+	6+	10+
R01	D LB8 I LB8 R LB8 M LB10	D LB6 I LB6 R LB6 M LB6	D LB8 I LB8 R LB8 M LB10
R14	D LB8 I LB8 R LB8 M LB10	D LB6 I LB6 R LB6 M LB6	D LB8 I LB8 R LB8 M LB10
R17	D LB8 I LB8 R LB8 M LB9	D LB6 I LB6 R LB6 M LB6	D LB8 I LB8 R LB8 M LB9

### Protection levels

Frame Art.No. ... T1K01	647 - 689 nm	690 - 749 nm	750 - 1200 nm	>1200 - 1320 nm	>1320 - 1400 nm	>1400 - 1520 nm	>1520 - 1550 nm	9000 - 11000 nm
OD	3+	6+	8+	6+	3+	3+	2+	4+
R01	D LB3 I LB3 R LB3 M LB3	D LB6 I LB6 R LB6 M LB6	D LB7 I LB8 R LB8 M LB8Y	D LB6 I LB6 R LB6 M LB6	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3Y M LB3	D LB2 I LB2 R LB2 M LB2	D LB4 I LB4
R14	D LB3 I LB3 R LB3 M LB3	D LB6 I LB6 R LB6 M LB6	D LB7 I LB8 R LB8 M LB8Y	D LB6 I LB6 R LB6 M LB6	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB4 I LB4
R17	D LB3 I LB3 R LB3 M LB3	D LB6 I LB6 R LB6 M LB6	D LB7 I LB8 R LB8 M LB8Y	D LB6 I LB6 R LB6 M LB6	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB4 I LB4



# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1K02



### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 70%

### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
CO<sub>2</sub>  
Telekom

## Filter T2K02



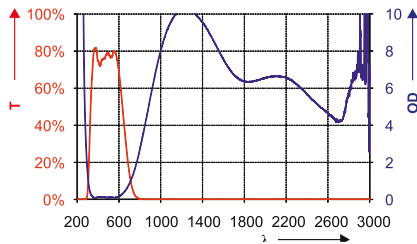
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 70%

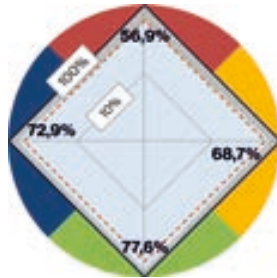
### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
CO<sub>2</sub>  
USP  
Telekom

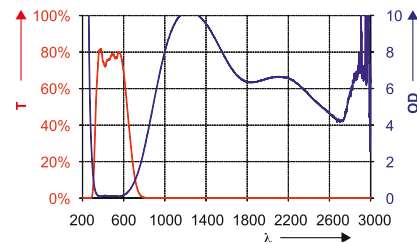
### Transmission-/OD Curve



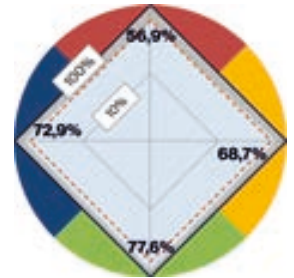
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T1K02	950 -1000 nm	>1000 -1050 nm	>1050 -1400 nm	>1400 -2700 nm	2700 -3000 nm	5400 nm	10600 nm
OD	5+	7+	8+	4+	4+	4+	4+
R01	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB3 R LB3	D LB4 I LB4	D LB4 I LB4	D LB4 I LB4
R14	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB3 R LB3	D LB4 I LB4	D LB4 I LB4	D LB4 I LB4
R17	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB3 R LB3	D LB4 I LB4	D LB4 I LB4	D LB4 I LB4

### Protection levels

Frame Art.No. ...T2K02	850 -900 nm	>900 -950 nm	>950 -<980 nm	980 -<1030 nm	1030 -1400 nm	>1400 -11500 nm
OD	3+	4+	5+	7+	8+	4+
F20	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB4 R LB4
F46	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB4 R LB3Y
R01	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB4 R LB3Y
R02	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB4Y R LB3
R10	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB4Y R LB4Y
R14	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB4 R LB4
R17	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8	D LB4 I LB4 R LB4

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1K03



### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 66%

### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 CO<sub>2</sub>  
 USP

## Filter T1K04



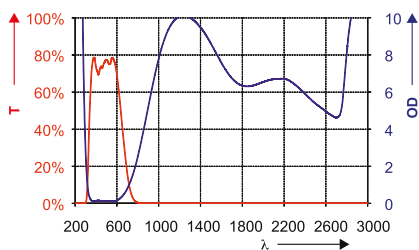
### Filter Properties

**Filter Material:** Coated Mineral Glass  
**Filter Technology:** Interference-/Absorption Filter  
**VLT (approx.):** 77%

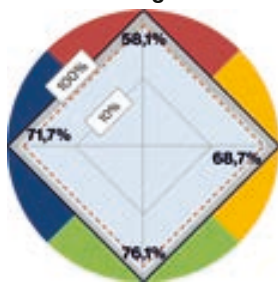
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 CO<sub>2</sub>  
 USP

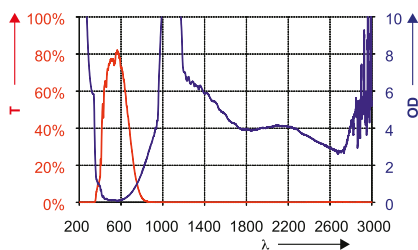
### Transmission-/OD Curve



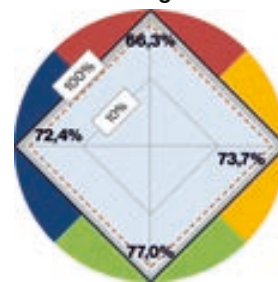
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... T1K03	900 -1000 nm	>1000 -1050 nm	>1050 -1400 nm	>1400 -2100 nm	>2100 -25000 nm					
OD	4+	7+	8+	5+	4+					
R01	D LB4 I LB4 R LB4 M LB4	D LB7 I LB7 R LB7 M LB7	D LB7 I LB8 R LB8 M LB8Y	D LB5 I LB5Y R LB3Y M LB4	D LB4 I LB4 R LB3Y M LB4					
R14	D LB4 I LB4 R LB4 M LB4	D LB7 I LB7 R LB7 M LB7	D LB7 I LB8 R LB8 M LB8Y	D LB5 I LB5Y R LB3Y M LB4	D LB4 I LB4 R LB3Y M LB4					
R17	D LB4 I LB4 R LB4 M LB4	D LB7 I LB7 R LB7 M LB7	D LB7 I LB8 R LB8 M LB8Y	D LB5 I LB5 R LB3Y M LB4Y	D LB4 I LB4 R LB3Y M LB4Y					

### Protection levels

Frame Art.No. ... T1K04	1030 -1100 nm	2000 -2200 nm	5400 nm	9000 -11000 nm						
OD	9+	2+	4+	4+						
F20	D LB8 I LB9 R LB9 M LB9	D LB2 I LB2 R LB1	D LB3 I LB4 R LB2	D LB3 I LB4 R LB2						
R01	D LB8 I LB9 R LB9 M LB9	D LB2 I LB2 R LB1	D LB3 I LB4 R LB2	D LB3 I LB4 R LB2						
R02	D LB8 I LB9 R LB9 M LB9	D LB2 I LB2 R LB1	D LB3 I LB4 R LB2	D LB3 I LB4 R LB2						
R14	D LB8 I LB9 R LB9 M LB9	D LB2 I LB2 R LB1	D LB3 I LB4 R LB2	D LB3 I LB4 R LB2						
R17	D LB8 I LB9 R LB9 M LB9	D LB2 I LB2 R LB1	D LB3 I LB4 R LB2	D LB3 I LB4 R LB2						

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T2K05



### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 75%

### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
CO<sub>2</sub>  
Telekom

## Filter T1K06



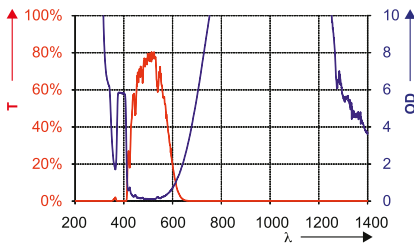
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 60%

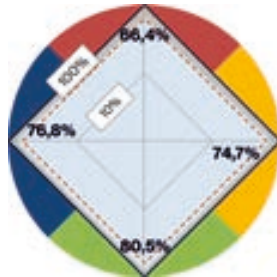
### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
Diodes  
CO<sub>2</sub>  
USP  
Telekom

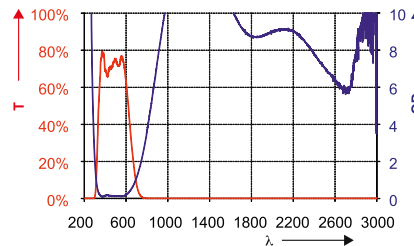
### Transmission-/OD Curve



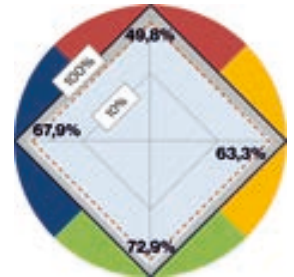
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T2K05	850 -900 nm	>900 -950 nm	>950 -1030 nm	>1030 -1400 nm	>1400 -2200 nm	2400 -2800 nm	>2800 -1500 nm	>1500 -25000 nm		
OD	2+	3+	4+	5+	4+	3+	4+	4+		
F20	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB3Y M LB3	D LB3 I LB3 R LB3Y M LB3	D LB4 I LB4 R LB3Y M LB4	D LB4 I LB4 R LB3Y M LB4		
F46	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB3Y M LB3	D LB3 I LB3 R LB3Y M LB3	D LB4 I LB4 R LB3Y M LB4	D LB4 I LB4 R LB3Y M LB4		
R01	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB3Y M LB3	D LB3 I LB3 R LB3Y M LB3	D LB4 I LB4 R LB3Y M LB4	D LB4 I LB4 R LB3Y M LB4		
R02	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4Y R LB3 M LB3	D LB3 I LB3 R LB3Y M LB3	D LB4 I LB4Y R LB3 M LB3Y			
R10	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4Y R LB3 M LB3	D LB3 I LB3 R LB3Y M LB3	D LB4 I LB4Y R LB3Y M LB3Y			
R14	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB3 M LB3	D LB3 I LB3 R LB3Y M LB3	D LB4 I LB4 R LB3Y M LB4	D LB4 I LB4 R LB3Y M LB4		
R17	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB4Y I LB3 R LB3 M LB3	D LB3 I LB3 R LB3Y M LB3	D LB4Y I LB3 R LB3Y M LB3Y	D LB4Y I LB3 R LB3Y M LB4Y		

### Protection levels

Frame Art.No. ...T1K06	730 -780 nm	780 -808 nm	808 -840 nm	>840 -870 nm	>870 -885 nm	>885 -900 nm	>900 -950 nm	>950 -1000 nm	>1000 -1400 nm	>1400 -3500 nm
OD	1+	2+	3+	4+	5+	6+	7+	8+	9+	5+
R01	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB7 I LB7 R LB7 M LB7	D LB7 I LB7 R LB8 M LB8	D LB7 I LB8 R LB8 M LB9	D LB5 I LB5Y R LB3Y M LB5Y
R14	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB7 I LB7 R LB7 M LB7	D LB7 I LB8 R LB8 M LB8	D LB7 I LB8 R LB8 M LB9	D LB5 I LB5Y R LB3Y M LB5Y
R17	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB7 I LB7 R LB7 M LB7	D LB7 I LB8 R LB8 M LB8	D LB7 I LB8 R LB8 M LB9	D LB5 I LB5Y R LB3Y M LB5Y
Frame Art.No. ...T1K06	>3500 -1500 nm	>3500 -25000 nm								
OD	10+	10+								
R01	D LB5 I LB5Y R LB3Y M LB6Y	D LB5 I LB5Y R LB3Y M LB6Y								
R14	D LB5 I LB5Y R LB3Y M LB6Y	D LB5 I LB5Y R LB3Y M LB6Y								
R17	D LB5 I LB5 R LB3Y M LB4Y	D LB5 I LB5 R LB3Y M LB4Y								

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1K15



### Filter Properties

**Filter Material:** Coated Mineral Glass  
**Filter Technology:** Interference-/Absorption Filter  
**VLT (approx.):** 65%

### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 CO<sub>2</sub>  
 USP

## Filter T2K15



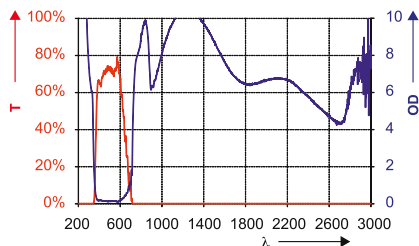
### Filter Properties

**Filter Material:** Coated Mineral Glass  
**Filter Technology:** Interference-/Absorption Filter  
**VLT (approx.):** 65%

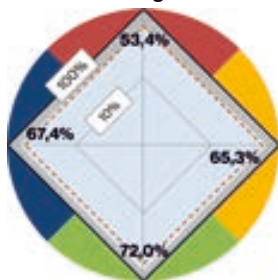
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 CO<sub>2</sub>  
 USP

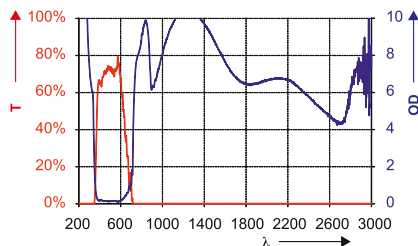
### Transmission-/OD Curve



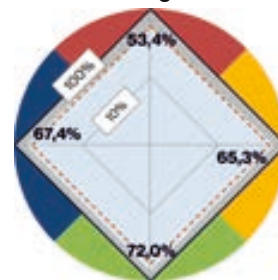
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T1K15	780-850 nm	>850-900 nm	>900-950 nm	>950-980 nm	980-1030 nm	1030-1400 nm	>1400-3000 nm	>3000-11500 nm
OD	6+	3+	4+	5+	7+	8+	4+	4+
R01	D LB6 I LB6 R LB6 M LB6	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB2
R14	D LB6 I LB6 R LB6 M LB6	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB2
R17	D LB6 I LB6 R LB6 M LB6	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB2

### Protection levels

Frame Art.No. ...T2K15	780-850 nm	>850-900 nm	>900-950 nm	>950-980 nm	980-1030 nm	1030-1400 nm	>1400-3000 nm	>3000-11500 nm
OD	6+	3+	4+	5+	7+	8+	4+	4+
F20	D LB6 I LB6 R LB6 M LB6	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB2
F46	D LB6 I LB6 R LB6 M LB6	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB2

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1K17



### Filter Properties

**Filter Material:** Coated Mineral Glass  
**Filter Technology:** Interference-/Absorption Filter  
**VLT (approx.):** 65%

### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 CO<sub>2</sub>  
 USP

## Filter T1L01



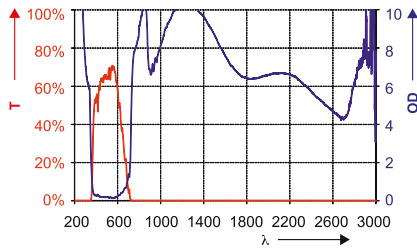
### Filter Properties

**Filter Material:** Coated Mineral Glass  
**Filter Technology:** Interference-/Absorption Filter  
**VLT (approx.):** 30%

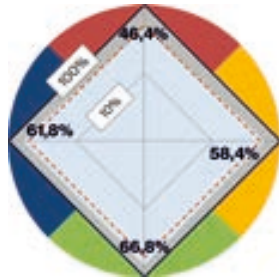
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 SHG  
 THG  
 FHG  
 CO<sub>2</sub>  
 USP

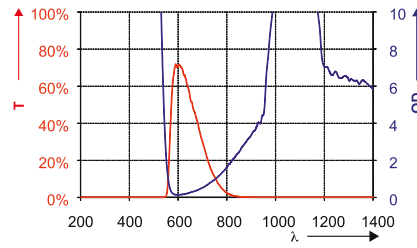
### Transmission-/OD Curve



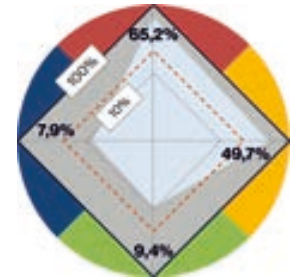
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... T1K17	745 -850 nm	>850 -950 nm	>950 -<980 nm	980 -<1030 nm	1030 -1400 nm	>1400 -3000 nm	>3000 -25000 nm
OD	7+	4+	5+	7+	8+	4+	4+
R01	D LB6 I LB6 R LB6 M LB7Y	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB3Y M LB4Y	D LB4 I LB4 R LB2
R14	D LB6 I LB6 R LB6 M LB7Y	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB2

### Protection levels

Frame Art.No. ... T1L01	180 -315 nm	>315 -535 nm	1030 -1100 nm	2000 -2200 nm	5400 nm	9000 -25000 nm
OD	10+	9+	9+	2+	4+	4+
R01	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB8 M LB9	D LB7 I LB9 R LB9 M LB9	D LB2 I LB2 R LB1 M LB1	D LB3 I LB4 R LB2 M LB2	D LB3 I LB4 R LB2 M LB2
R14	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB8 M LB9	D LB7 I LB9 R LB9 M LB9	D LB2 I LB2 R LB1 M LB1	D LB3 I LB4 R LB2 M LB2	D LB3 I LB4 R LB2 M LB2
R17	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB8 M LB9	D LB7 I LB9 R LB9 M LB9	D LB2 I LB2 R LB1 M LB1	D LB3 I LB4 R LB2 M LB2	D LB3 I LB4 R LB2 M LB2

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1L02



### Filter Properties

**Filter Material:** Coated Mineral Glass  
**Filter Technology:** Interference-/Absorption Filter  
**VLT (approx.):** 15%

### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 SHG  
 THG  
 FHG  
 CO<sub>2</sub>  
 USP

## Filter T1M01



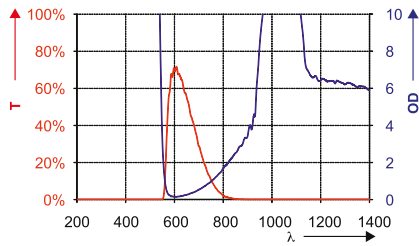
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 25%

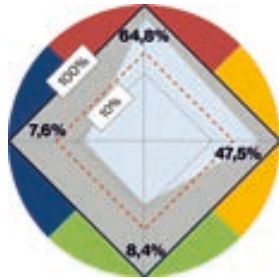
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 SHG  
 THG  
 FHG  
 Diodes  
 CO<sub>2</sub>  
 USP

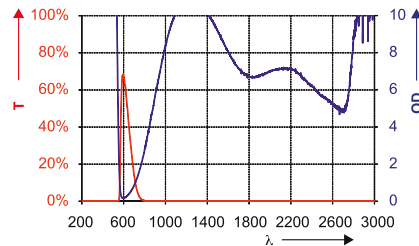
### Transmission-/OD Curve



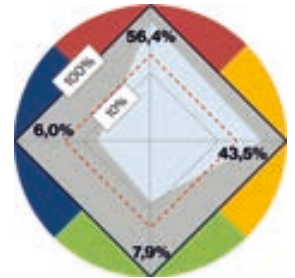
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T1L02	180 -315 nm	>315 -532 nm	532 -535 nm	1030 -1100 nm	>2000 -2200 nm	5400 nm	9000 -11500 nm	>11500 -25000 nm		
OD	10+	9+	9+	10+	9+	9+	10+	9+		
R01	D LB9 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB7Y M LB9	D LB7 I LB9 R LB7 M LB9	D LB9 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB7Y M LB9	D LB7 I LB9 R LB7 M LB9	D LB9 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB7Y M LB9		
R14	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB7Y M LB9	D LB8 I LB9 R LB7 M LB9	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB7Y M LB9	D LB8 I LB9 R LB7 M LB9	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB7Y M LB9		
R17	I LB5 R LB5	I LB7 R LB7Y	I LB9 R LB7	I LB5 R LB5	I LB7 R LB7Y	I LB9 R LB7	I LB5 R LB5	I LB7 R LB7Y		

### Protection levels

Frame Art.No. ...T1M01	180 -315 nm	>315 -532 nm	808 -<890 nm	890 -<940 nm	940 -<1000 nm	1000 -<1025 nm	1025 -<1100 nm	>1100 -1400 nm	>1400 -3000 nm	>3000 -11500 nm
OD	10+	8+	3+	5+	6+	7+	9+	8+	4+	5+
R01	D LB10 I LB5 R LB5	D LB7 I LB8 R LB8	D LB3 I LB3 R LB3	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB7 I LB7 R LB7	D LB7 I LB8 R LB8	D LB7 I LB8 R LB8	D LB4 I LB4	D LB5 I LB5Y
R14	D LB10 I LB5 R LB5	D LB7 I LB8 R LB8	D LB3 I LB3 R LB3	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB7 I LB7 R LB7	D LB7 I LB8 R LB8	D LB7 I LB8 R LB8	D LB4 I LB4	D LB5 I LB5Y

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1P01



### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 7%

### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
SHG  
THG  
FHG  
Diodes  
Ti:Sa, OPOs, OPAs  
CO<sub>2</sub>  
USP

## Filter T1P02



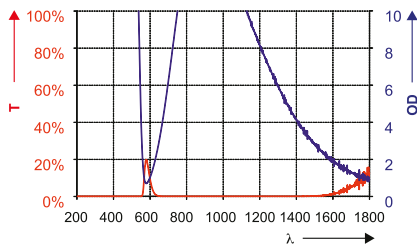
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 10%

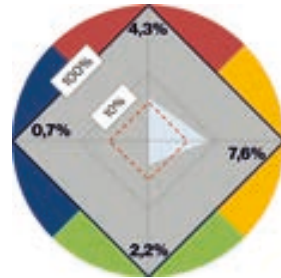
### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
SHG  
THG  
FHG  
Diodes  
Ti:Sa, OPOs, OPAs  
CO<sub>2</sub>  
USP

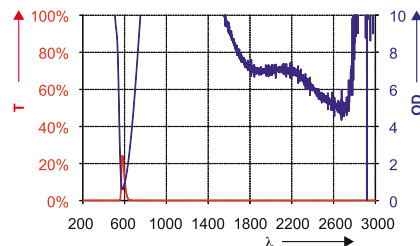
### Transmission-/OD Curve



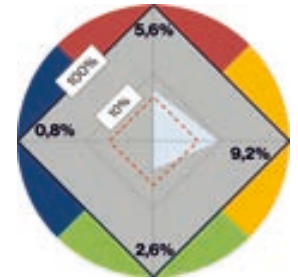
### Transmission of Signal Colours



### Transmission-/OD Curve





### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T1P01	180 -315 nm	>315 -532 nm	750 -1100 nm	9000 -11500 nm	
OD	8+	9+	9+	5+	
R01 	D LB8 I LB5 R LB5 MLB6Y	D LB7 I LB7 R LB8 MLB8Y	D LB6 I LB9 R LB8 MLB9	D LB5 I LB4	
R14 	D LB8 I LB5 R LB5 MLB6Y	D LB7 I LB7 R LB9 MLB8Y	D LB6 I LB9 R LB9 MLB9	D LB5 I LB4	
R17 	D LB8 I LB5 R LB5 R LB6Y	D LB7 I LB7 R LB9 MLB8Y	D LB6 I LB9 R LB9 MLB9	D LB5 I LB4	

### Protection levels

Frame Art.No. ...T1P02	180 -315 nm	>315 -532 nm	620 -650 nm	>650 -690 nm	>690 -720 nm	>720 -750 nm	750 -1400 nm	>1400 -2500 nm	9000 -11500 nm	
OD	10+	8+	1+	2+	4+	5+	9+	5+	10+	
R01 	D LB8 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB7Y M LB8Y	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB9 R LB8 M LB9	D LB4 I LB4 R LB3Y M LB4Y	D LB5 I LB4	
R14 	D LB8 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB7Y M LB8Y	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB9 R LB8 M LB9	D LB4 I LB4 R LB4 M LB4	D LB5 I LB4	

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1P04



### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 4%

### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 SHG  
 THG  
 FHG  
 Diodes  
 Ti:Sa, OPOs, OPAs  
 CO<sub>2</sub>  
 USP

## Filter T1P05



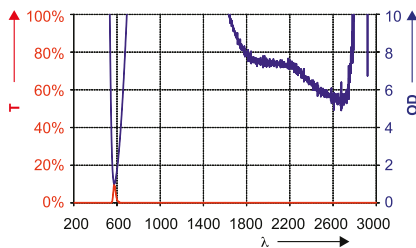
### Filter Properties

**Filter Material:** Coated Mineral Glass  
**Filter Technology:** Interference-/Absorption Filter  
**VLT (approx.):** 15%

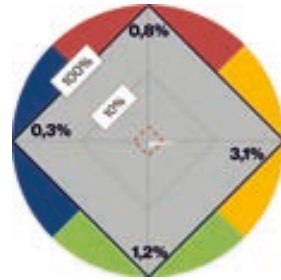
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 SHG  
 THG  
 FHG  
 Diodes  
 Ti:Sa, OPOs, OPAs  
 CO<sub>2</sub>  
 USP

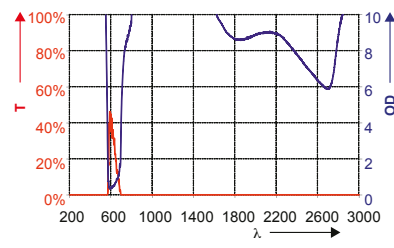
### Transmission-/OD Curve



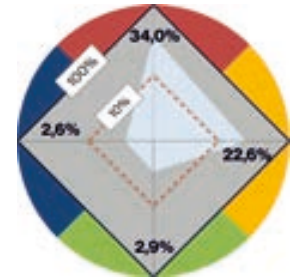
### Transmission of Signal Colours





### Transmission-/OD Curve







### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T1P04	180 -315 nm	>315 -535 nm	620 -680 nm	680 -690 nm	690 -750 nm	750 -1400 nm	>1400 -<3000 nm	3000 -25000 nm	
OD	10+	9+	2+	7+	8+	9+	5+	10+	
R01 	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB8 M LB9	D LB2 I LB2 R LB2 M LB2	D LB6 I LB7 R RLB7 M LB7	D LB7 I LB8 R RLB8 M LB8	D LB7 I LB9 R RLB8 M LB9	D LB5 I LB5Y R LB3Y M LB5Y	D LB5 I LB5Y M LB6Y	
R14 	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB7 R LB8 M LB9	D LB2 I LB2 R LB2 M LB2	D LB6 I LB7 R RLB7 M LB7	D LB7 I LB8 R RLB8 M LB8	D LB7 I LB9 R RLB8 M LB9	D LB5 I LB5Y R LB4 M LB5Y	D LB5 I LB5Y M LB6Y	

### Protection levels

Frame Art.No. ...T1P04	180 -315 nm	>315 -535 nm	532 -535 nm	730 -<780 nm	780 -<808 nm	808 -860 nm	>860 -<885 nm	885 -<900 nm	900 -<1025 nm	1025 -1400 nm
OD	OD10+	OD9+	OD10+	OD1+	OD7+	OD8+	OD5+	OD6+	OD7+	OD7+
R01 	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB8 R LB8 M LB9	D LB8 I LB9 R LB9 M LB10	D LB1 I LB1 R LB1 M LB1	D LB7 I LB7 R LB7 M LB7	D LB8 I LB8 R LB8 M LB8	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB7 I LB7 R LB7 M LB7	D LB8 I LB9 R LB9 M LB10
R14 	D LB10 I LB5 R LB5 M LB6Y	D LB7 I LB8 R LB8 M LB9	D LB8 I LB9 R LB9 M LB10	D LB1 I LB1 R LB1 M LB1	D LB7 I LB7 R LB7 M LB7	D LB8 I LB8 R LB8 M LB8	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB7 I LB7 R LB7 M LB7	D LB8 I LB9 R LB9 M LB10
OD	OD5+	OD6+								
R01 	D LB5 I LB5Y R LB3Y M LB5Y	D LB5 I LB5Y R LB3Y M LB6Y								
R14 	D LB5 I LB5Y R LB4 M LB5	D LB5 I LB5Y R LB3Y M LB6Y								



# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1P07



### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Interference-/Absorption Filter  
**VLT (approx.):** 15%

### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 SHG  
 THG  
 FHG  
 Diodes  
 Ti:Sa, OPOs, OPAs  
 CO<sub>2</sub>  
 USP

## Filter T1Q01



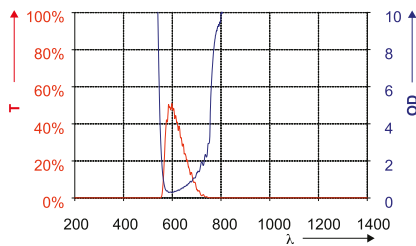
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 35%

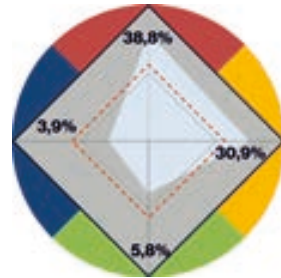
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 Ti:Sa, OPOs, OPAs  
 CO<sub>2</sub>

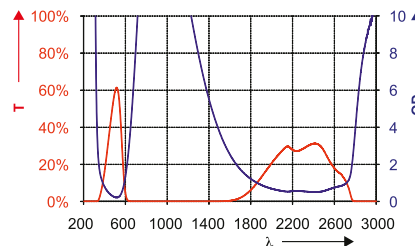
### Transmission-/OD Curve



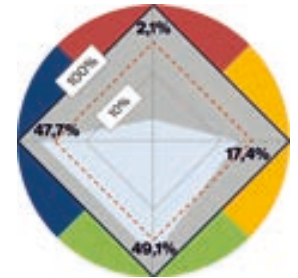
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... T1P07	180 - 315 nm	>315 - <532 nm	532 - 540 nm	730 - <760 nm	760 - <780 nm	780 - <808 nm	808 - 860 nm	>860 - 1025 nm	>1025 - 1100 nm	>1100 - 1400 nm
OD	10+	10+	10+	1+	2+	7+	8+	8+	10+	10+
R01	D LB10 I LB4 R LB4 M LB6Y	D LB7 I LB8 R LB8 M LB9	D LB8 I LB9 R LB9 M LB10	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB7 I LB7 R LB7 M LB7	D LB8 I LB8 R LB8 M LB8	D LB7 I LB8 R LB8 M LB8	D LB8 I LB9 R LB9 M LB10	D LB7 I LB8 R LB8 M LB9
R14	D LB10 I LB4 R LB4 M LB6Y	D LB7 I LB8 R LB8 M LB9	D LB8 I LB9 R LB9 M LB10	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB7 I LB7 R LB7 M LB7	D LB8 I LB8 R LB8 M LB8	D LB7 I LB8 R LB8 M LB8	D LB8 I LB9 R LB9 M LB10	D LB7 I LB8 R LB8 M LB9

Frame Art.No. ... T1P07	>1400 - 3500 nm	>3500 - 25000 nm
OD	5+	10+
R01	D LB5 I LB5Y R LB3Y M LB5Y	D LB5 I LB5Y R LB3Y M LB6Y
R14	D LB5 I LB5Y R LB4 M LB5	D LB5 I LB5Y R LB3Y M LB6Y

### Protection levels

Frame Art.No. ... T1Q01	690 - 795 nm	>795 - 1100 nm	>1100 - 1200 nm	>1200 - 1320 nm	>1320 - 1400 nm	>1400 - 1550 nm	10600 nm	633 nm
OD	7+	9+	8+	7+	3+	3+	4+	2-3
R01	D LB7 I LB7 R LB7 M LB7	D LB7 I LB7 R LB7 M LB9	D LB7 I LB7 R LB7 M LB8	D LB7 I LB7 R LB7 M LB7	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4	0,1W 2x10E-5J RB2
R14	D LB7 I LB7 R LB7 M LB7	D LB7 I LB7 R LB7 M LB9	D LB7 I LB7 R LB7 M LB8	D LB7 I LB7 R LB7 M LB7	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4	0,1W 2x10E-5J RB2
R17	D LB7 I LB7 R LB7 M LB7	D LB7 I LB7 R LB7 M LB9	D LB7 I LB7 R LB7 M LB8	D LB7 I LB7 R LB7 M LB7	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4	0,1W 2x10E-5J RB2

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1Q02



### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 32%

### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 Ti:Sa, OPOs, OPAs  
 USP

## Filter T1Q03



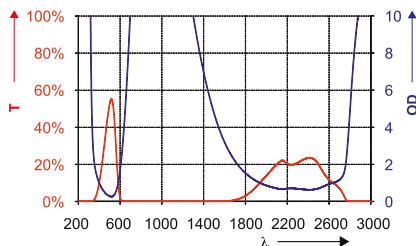
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 45%

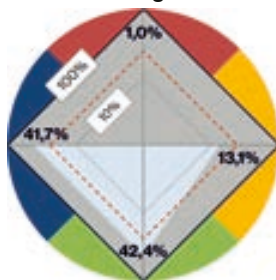
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 Ti:Sa, OPOs, OPAs  
 CO<sub>2</sub>

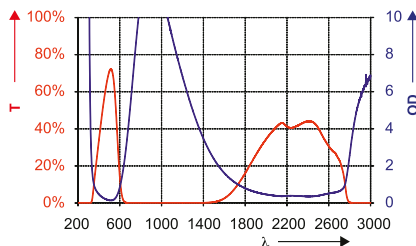
### Transmission-/OD Curve



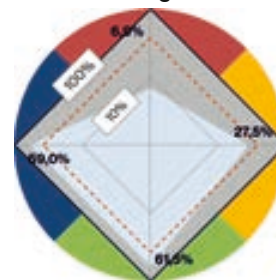
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T1Q02	620 -<680 nm	680 -<690 nm	690 -755 nm	>755 -795 nm	>795 -1064 nm	>1064 -1320 nm	>1320 -1400 nm	>1400 -1580 nm	630 -635 nm
OD	2+	6+	8+	8+	9+	7+	5+	3+	3-4
R01	D LB2 I LB2 R LB2 M LB2	D LB5 I LB6 R LB6 M LB5	D LB7 I LB8 R LB8 M LB8	D LB7 I LB7 R LB7 M LB9	D LB7 I LB7 R LB7 M LB5	D LB7 I LB7 R LB7 M LB5	D LB5 I LB5 R LB5 M LB5	D LB3 I LB2 R LB2 M LB1	1W 2x10E-4J RB3
R14	D LB2 I LB2 R LB2 M LB2	D LB5 I LB6 R LB6 M LB5	D LB7 I LB8 R LB8 M LB8	D LB7 I LB7 R LB7 M LB9	D LB7 I LB7 R LB7 M LB5	D LB7 I LB7 R LB7 M LB5	D LB5 I LB5 R LB5 M LB5	D LB3 I LB2 R LB2 M LB1	1W 2x10E-4J RB3
R17	D LB2 I LB2 R LB2 M LB2	D LB5 I LB6 R LB6 M LB5	D LB7 I LB8 R LB8 M LB8	D LB7 I LB7 R LB7 M LB9	D LB7 I LB7 R LB7 M LB5	D LB7 I LB7 R LB7 M LB5	D LB5 I LB5 R LB5 M LB5	D LB3 I LB2 R LB2 M LB1	1W 2x10E-4J RB3

### Protection levels

Frame Art.No. ...T1Q03	750 -800 nm	>800 -1064 nm	>1064 -1100 nm	>3000 -11500 nm	>1500 -25000 nm	630 -635 nm
OD	8+	9+	8+	4+	4+	1-2
R01	D LB6 I LB8 R LB8 M LB8	D LB6 I LB8 R LB8 M LB9	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB3Y M LB4Y	D LB4 I LB4 R LB3Y M LB4Y	0,01W 2x10E-6J RB1
R14	D LB6 I LB8 R LB8 M LB8	D LB6 I LB8 R LB8 M LB9	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB3Y M LB4Y	D LB4 I LB4 R LB3Y M LB4Y	0,01W 2x10E-6J RB1
R17	D LB6 I LB8 R LB8 M LB8	D LB6 I LB8 R LB8 M LB9	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB3Y M LB4Y	D LB4 I LB4 R LB3Y M LB4Y	0,01W 2x10E-6J RB1

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T2Q04



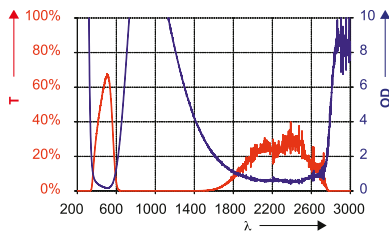
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 45%

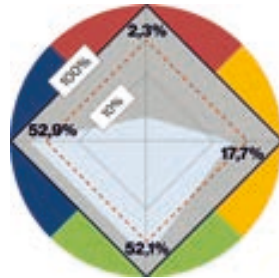
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 USP

### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T2Q04	750 -1100 nm
OD	8+
F20	D LB7 I LB8 R LB8 M LB8Y
F46	D LB6 I LB8 R LB8 M LB8Y
R02	D LB7 I LB8 R LB8 M LB8Y

## Filter T1Q05



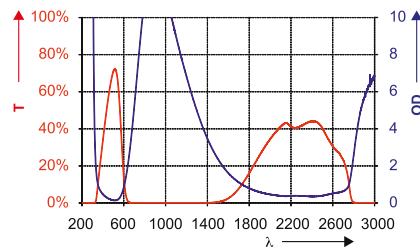
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 32%

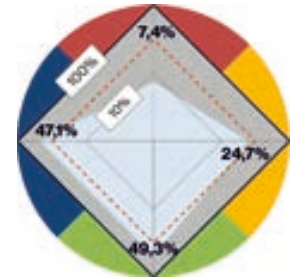
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 Diodes  
 CO<sub>2</sub>  
 USP

### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...T1Q05	650 -<660 nm	660 -<700 nm	700 -<725 nm	725 -<730 nm	730 -<750 nm	750 -775 nm	>775 -<780 nm	780 -<800 nm	800 -1400 nm	>1400 -3500 nm
OD	1+	2+	3+	4+	5+	6+	7+	8+	9+	5+
R01	D LB1 I LB1	D LB2 I LB2	D LB3 I LB3	D LB4 I LB4	D LB5 I LB5	D LB6 I LB6	D LB7 I LB7	D LB7 I LB8	D LB7 I LB8	D LB5 I LB5Y
R14	R LB1 M LB1	R LB2 M LB2	R LB3 M LB3	R LB4 M LB4	R LB5 M LB5	R LB6 M LB6	R LB7 M LB7	R LB8 M LB8	R LB8 M LB9	R LB3Y M LB5Y
Frame Art.No. ...T1Q05	>3500 -25000 nm	660 nm								
OD	6+	2-3								
R01	D LB5 I LB5Y R LB3Y M LB6Y	0,1W 2x10E-5J RB2								
R14	D LB5 I LB5Y R LB3Y M LB6Y	0,1W 2x10E-5J RB2								

# Glass/Coated Filters for Laser Safety Eyewear

## Filter T1Q06



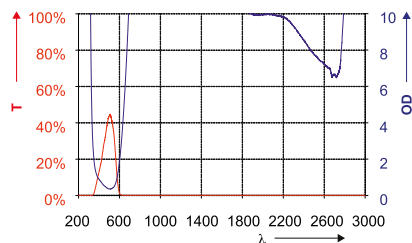
### Filter Properties

**Filter Material:** Mineral Glass  
**Filter Technology:** Absorption Filter  
**VLT (approx.):** 25%

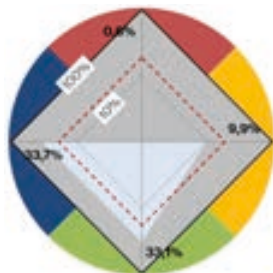
### Typical Lasers

Nd:YAG  
 Fiber laser  
 Disc laser  
 FHG  
 Diodes  
 Ti:Sa, OPOs, OPAs  
 CO<sub>2</sub>  
 USP

### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... T1Q05	180 -310 nm	>310 -315 nm	620 -<680 nm	680 -<690 nm	690 -<750 nm	750 -1400 nm	1400 -1580 nm	>1580 -3000 nm	>3000 -25000 nm
OD	10+	9+	2+	7+	10+	10+	9+	5+	10+
R01	D LB10 I LB4 R LB4 M LB6Y	D LB9 I LB4 R LB4 M LB6Y	D LB2 I LB2 R LB2 M LB2	D LB6 I LB6 R LB6 M LB6	D LB7 I LB8 R LB8 M LB8	D LB7 I LB9 R LB8 M LB9	D LB5 I LB5Y R LB3Y M LB4Y	D LB5 I LB5Y R LB3Y M LB4Y	D LB5 I LB5Y R LB3Y M LB4Y
R14	D LB10 I LB4 R LB4 M LB6Y	D LB9 I LB4 R LB4 M LB6Y	D LB2 I LB2 R LB2 M LB2	D LB6 I LB6 R LB6 M LB6	D LB7 I LB8 R LB8 M LB8	D LB7 I LB9 R LB8 M LB9	D LB5 I LB5Y R LB3Y M LB4Y	D LB5 I LB5Y R LB3Y M LB4Y	D LB5 I LB5Y R LB3Y M LB4Y



# Rx-Insert glazing service

for frames

# R01 | R17 | F46

# Plastic Laser Safety Eyewear



Plastic laser safety eyewear is laservision's strongest PPE product line in terms of numbers. For these products, we trust in uvex's knowledge and expertise and manufacture in one of the world's most modern plants for eye protection products – **Made in uvex.**

With a variety of frames and a large range of filters from laservision, they are suitable for use in virtually any application. The lightweight design and many frame options ensure excellent wearing comfort. and series production using an injection moulding process means plastic laser safety eyewear is more affordable than comparable eyewear with mineral glass filters.

## EN 207 / EN 208

- Standards for laser safety eyewear
- Based on PPE Directive
- Laser damage test, 5 sec. (50 pulses)
- Regular recertification by independent Notified Body
- Protective effect indicated by LB ratings

**Laser safety filters made from absorbing plastic**  
These are available on our website:



**Further information on the standards**  
can be found on our website:



**Further information on the PPE Directive** is provided on our website:



# Plastic Filters for Laser Safety Eyewear

## Filter P1B05



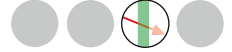
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 42%

### Typical Lasers

Diodes

## Filter P1B06



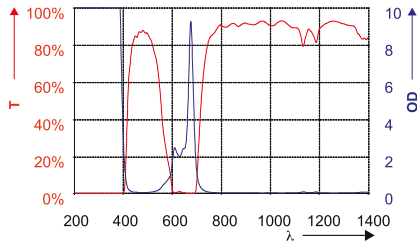
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 10%

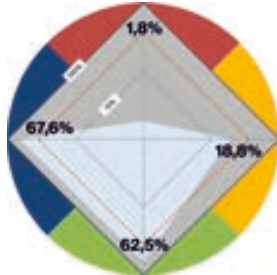
### Typical Lasers

Diodes

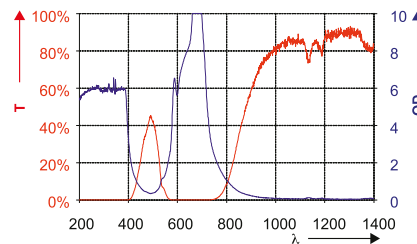
### Transmission-/OD Curve



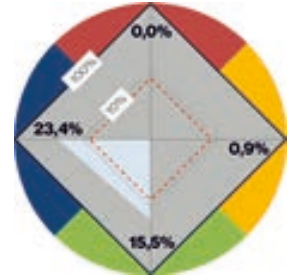
### Transmission of Signal Colours





### Transmission-/OD Curve









### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...P1B05	595 -600 nm	610 -650 nm	650 -<660 nm	660 -<665 nm	665 -<670 nm	670 -680 nm	>680 -<685 nm	
OD	1-2	2-3	2+	3+	4+	7+	5+	
F18 	0,01W 2x10E-6J RB1	0,1W 2x10E-5J RB2	D LB2 I LB2 R LB2	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB7 R LB7	D LB5 I LB5 R LB5	
F22 	0,01W 2x10E-6J RB1	0,1W 2x10E-5J RB2	D LB2 I LB2 R LB2	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB7 R LB7	D LB5 I LB5 R LB5	
F42 	0,01W 2x10E-6J RB1	0,1W 2x10E-5J RB2	D LB2 I LB2 R LB2	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB7 R LB7	D LB5 I LB5 R LB5	

### Protection levels

Frame Art.No. ...P1B06	540 -555 nm	565 -<574 nm	574 -<577 nm	577 -<582 nm	582 -<585 nm	585 -590 nm	>590 -<607 nm	607 -<630 nm	630 -<655 nm	655 -700 nm
OD	1-2	2+	3+	4+	5+	6+	5+	6+	7+	8+
F18 	0,01W 2x10E-6J RB1	D LB2 I LB2 R LB2	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8
F22 	0,01W 2x10E-6J RB1	D LB2 I LB2 R LB2	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8
F42 	0,01W 2x10E-6J RB1	D LB2 I LB2 R LB2	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB6 I LB7 R LB7	D LB6 I LB8 R LB8
OD	>700 -715 nm	>715 -<725 nm								
F18 	D LB6 I LB6 R LB6	D LB4 I LB4 R LB4								
F22 	D LB6 I LB6 R LB6	D LB4 I LB4 R LB4								
F42 	D LB6 I LB6 R LB6	D LB4 I LB4 R LB4								

# Plastic Filters for Laser Safety Eyewear

## Filter P1C02



### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 60%

### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
Diodes

## Filter P1D01



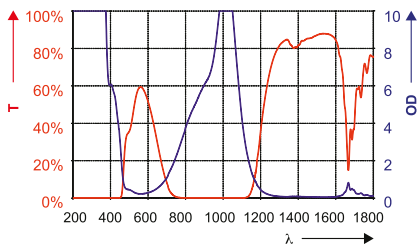
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 90%

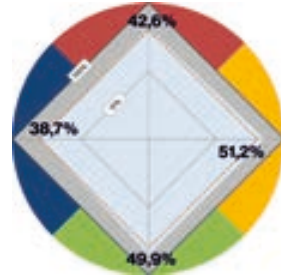
### Typical Lasers

THG  
FHG  
CO<sub>2</sub>  
USP

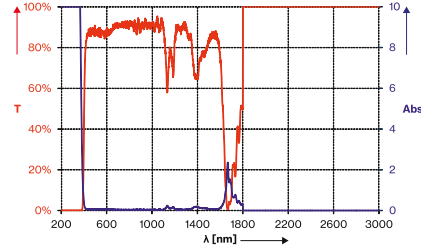
### Transmission-/OD Curve



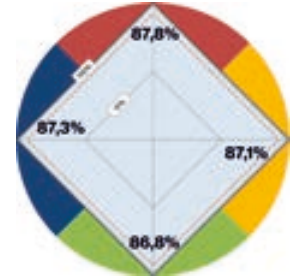
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...P1C02	780 -<810 nm	810 -<860 nm	860 -<900 nm	900 -<940 nm	940 -<1070 nm	>1070 -<1080 nm	>1080 -<1100 nm	
OD	3+	4+	5+	6+	7+	6+	4+	
F20	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB6 I LB7 R LB7	D LB6 I LB6 R LB6	D LB4 I LB4 R LB4	
F18/F22/F42	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB6 I LB7 R LB7	D LB6 I LB6 R LB6	D LB4 I LB4 R LB4	
F29	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB6 I LB7 R LB7	D LB6 I LB6 R LB6	D LB4 I LB4 R LB4	

### Protection levels

Frame Art.No. ...P1D01	180 -315 nm	>315 -367 nm	>367 -369 nm	>369 -371 nm	>371 -373 nm	>373 -375 nm	>375 -377 nm	>377 -380 nm	>380 -384 nm	3950 -11500 nm
OD	9+	7+	8+	6+	5+	4+	3+	2+	1+	4+
R02	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB7Y	D LB6 I LB7 R LB7 M LB7Y	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1	D LB4 I LB4 R LB3Y M LB4

Frame Art.No. ...P1D01	180 -315 nm	>315 -367 nm	>367 -369 nm	>369 -371 nm	>371 -373 nm	>373 -375 nm	>375 -377 nm	>377 -380 nm	>380 -384 nm	3950 -<4700 nm	
OD	10+	8+	7+	6+	5+	4+	3+	2+	1+	4+	
R14	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB7Y	D LB6 I LB7 R LB7 M LB7Y	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1	D LB4 I LB4 R LB3Y M LB4	
Frame Art.No. ...P1D01	4700 -<4765 nm	4765 -25000 nm									
OD	5+	6+									
R14	D LB5 I LB5Y R LB3Y M LB5	D LB5 I LB5Y R LB3Y M LB6Y									

# Plastic Filters for Laser Safety Eyewear

## Filter P1E01



### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 40%

### Typical Lasers

SHG  
THG  
FHG  
Diodes  
USP

## Filter P1E02



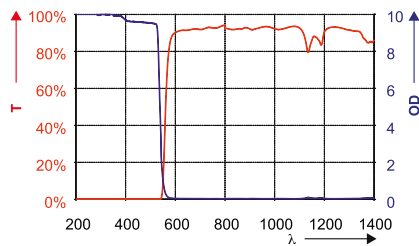
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 15%

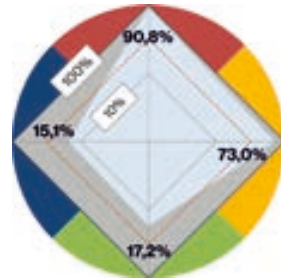
### Typical Lasers

Diodes

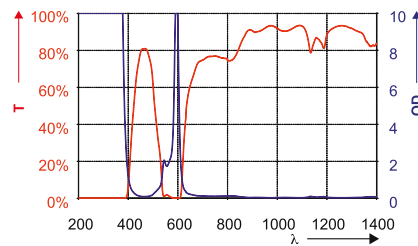
### Transmission-/OD Curve



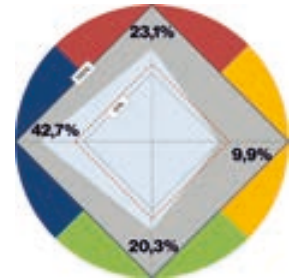
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... P1E01	180 - 315 nm	>315 - 532 nm	>532 - 534 nm	>534 - 536 nm	>536 - 538 nm	>538 - 540 nm	>540 - 542 nm	>542 - 545 nm	>545 - 550 nm
OD	10+	8+	7+	6+	5+	4+	3+	2+	1+
F18	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1
F20	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1
F22	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1
F42	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1
F46	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1

### Protection levels

Frame Art.No. ... P1E01	585 - 600 nm	>600 - 605 nm
OD	6+	5+
F18/F22/F42	D LB5 I LB6 R LB6	D LB5 I LB5 R LB5



# Plastic Filters for Laser Safety Eyewear

## Filter P1E03



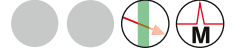
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 45%

### Typical Lasers

Diodes

## Filter P1E07



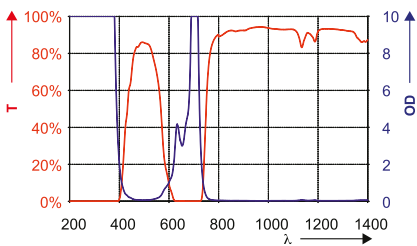
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 28%

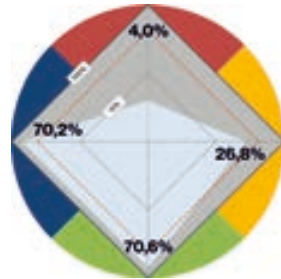
### Typical Lasers

SHG  
THG  
FHG  
Diodes  
USP

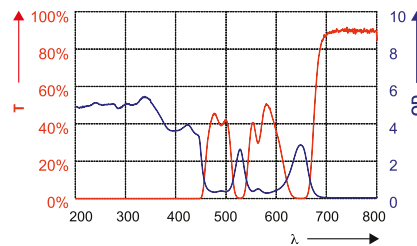
### Transmission-/OD Curve



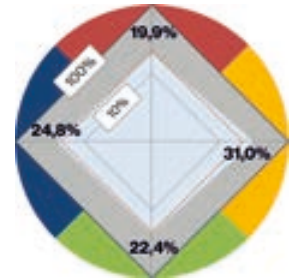
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... P1E03	630 -<690 nm	690 -710 nm
OD	3+	7+
F18/F22/F42	D LB3 I LB3 R LB3	D LB5 I LB7 R LB7

### Protection levels

Frame Art.No. ... P1E07	180 -315 nm	>315 -446 nm	>446 -450 nm	>450 -455 nm	515 -<520 nm	520 -534 nm	>534 -540 nm	625 -<637 nm	637 -659 nm	>659 -666 nm
OD	3+	3+	2+	1+	1-2	2-3	1-2	1-2	2-3	1-2
F18/F22/F42	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1	0,01 W 2x10E-6J	0,1 W 2x10E-5J	0,01 W 2x10E-6J	0,01 W 2x10E-6J	0,1 W 2x10E-5J	0,01 W 2x10E-6J
F29	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1	0,01 W 2x10E-6J	0,1 W 2x10E-5J	0,01 W 2x10E-6J	0,01 W 2x10E-6J	0,1 W 2x10E-5J	0,01 W 2x10E-6J

# Plastic Filters for Laser Safety Eyewear

## Filter P1F01



### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 35%

### Typical Lasers

THG  
FHG  
Diodes

## Filter P1G04



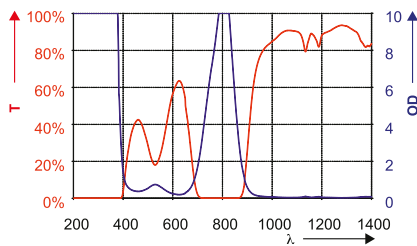
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 90%

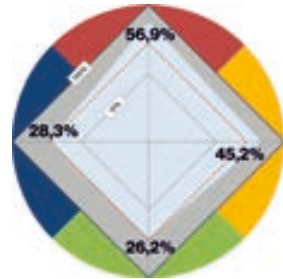
### Typical Lasers

THG  
FHG  
CO<sub>2</sub>  
USP

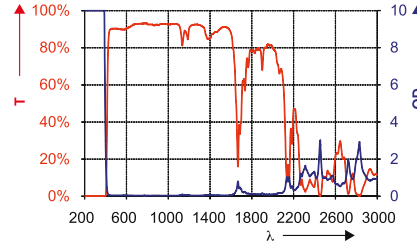
### Transmission-/OD Curve



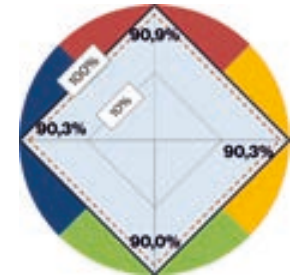
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

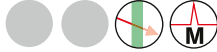
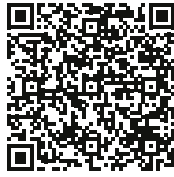
Frame Art.No. ... P1F01	180 -315 nm	>315 -375 nm	>375 -390 nm	730 -<755 nm	755 -840 nm	>840 -855 nm	
OD	5+	5+	3+	4+	7+	4+	
F18/F22/F42	D LB5 R LB4	D LB4 R LB5	D LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB7Y R LB5	D LB4 I LB4 R LB4	
F20	D LB5 R LB4	D LB4 R LB5	D LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB7Y R LB5	D LB4 I LB4 R LB4	

### Protection levels

Frame Art.No. ... P1G04	180 -315 nm	>315 -384 nm	>384 -388 nm	>388 -392 nm	>392 -396 nm	>396 -400 nm	5250 -14000 nm	10600 nm	
OD	10+	10+	8+	6+	4+	3+	5+	8+	
F18/F22/F42	D LB10 I LB4	D LB6 I LB8	D LB6 I LB8	D LB6 I LB6	D LB4 I LB4	D LB3 I LB3	D LB4 I LB4	D LB4 I LB4	
F29	R LB4 M LB6Y	R LB8 M LB7Y	R LB8 M LB7Y	R LB6 M LB6	R LB4 M LB4	R LB3 M LB3	R LB3Y R LB3Y	R LB3Y R LB3Y	

# Plastic Filters for Laser Safety Eyewear

## Filter P1H02



### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 42%

### Typical Lasers

USP

## Filter P1H03



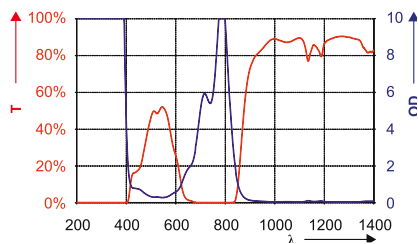
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 10%

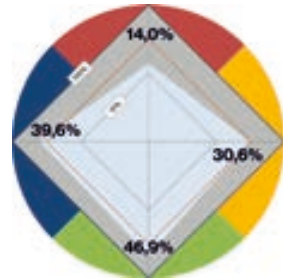
### Typical Lasers

Diodes  
USP

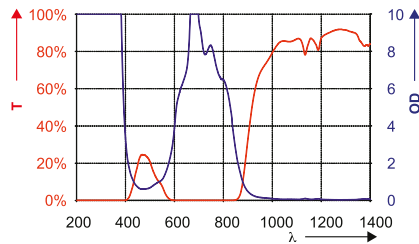
### Transmission-/OD Curve



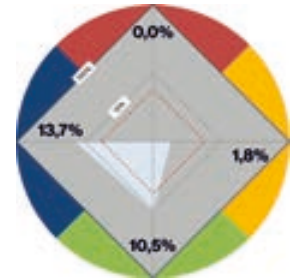
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... P1H02	660 -<682 nm	682 -<692 nm	692 -<700 nm	700 -<755 nm	755 -<760 nm	760 -810 nm	>810 -820 nm	625 -<660 nm	660 -675 nm
OD	2+	3+	4+	5+	6+	7+	5+	1-2	2-3
F18/F22/F42	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7Y	D LB5 I LB5 R LB5 M LB5	0,01W 2x10E-6J	0,1W 2x10E-5J
F29	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB5 I LB5 R LB5 M LB5	D LB6 I LB7 R LB7 M LB7Y	D LB5 I LB5 R LB5 M LB5	0,01W 2x10E-6J	0,1W 2x10E-5J

### Protection levels

Frame Art.No. ... P1H03	540 -<578 nm	578 -<595 nm	595 -<610 nm	610 -<630 nm	630 -<660 nm	660 -775 nm	>775 -790 nm	>790 -800 nm	>800 -820 nm	>820 -835 nm
OD	1+	2+	3+	5+	6+	7+	6+	5+	4+	3+
F18/F22/F42	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7Y	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3
F29	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7Y	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3
Frame Art.No. ... P1H03	>835 -850 nm	>850 -870 nm								
OD	2+	1+								
F18/F22/F42	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1								
F29	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1								

# Plastic Filters for Laser Safety Eyewear

## P1H06



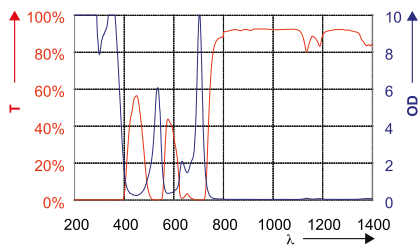
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 15%

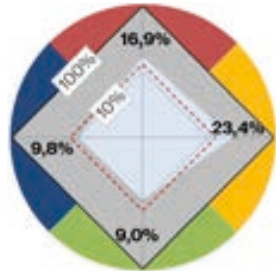
### Typical Lasers

SHG

### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... P1H06	532 nm
OD	6+
F18/F22/F42	D LB6 I LB6 R LB6
F29	D LB6 I LB6 R LB6 M LB1

## Filter P1L02



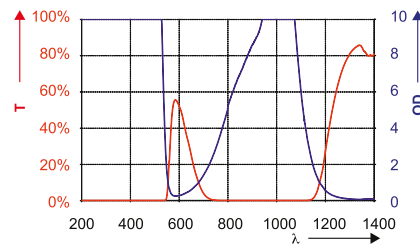
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 30%

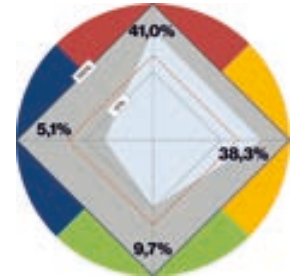
### Typical Lasers

FHG Nd:YAG  
Diodes Fiber laser  
Ti:Sa, OPOs, OPAs Disc laser  
USP SHG  
THG

### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... P1L02	180 -315 nm	>315 -532 nm	>532 -534 nm	>534 -536 nm	>536 -538 nm	>538 -540 nm	780 -<810 nm	810 -<860 nm	860 -<900 nm	900 -<940 nm
OD	8+	8+	7+	6+	5+	4+	3+	4+	5+	6+
F18/F22/F42	D LB8 I LB4 R LB4 M LB6	D LB6 I LB7 R LB8 M LB8	D LB6 I LB6 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6
F29	D LB8 I LB4 R LB4 M LB6	D LB6 I LB7 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6
F20	D LB8 I LB4 R LB4 M LB6	D LB6 I LB7 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6
F46	D LB8 I LB4 R LB4 M LB6	D LB6 I LB7 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6
Frame Art.No. ... P1L02	940 -1070 nm	>1070 -1080 nm	>1080 -1100 nm							
OD	7+	6+	4+							
F18/F22/F42	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4							
F29	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4							
F20	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4							
F46	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4							

# Plastic Filters for Laser Safety Eyewear

## Filter P1L07



### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 10%

### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
SHG  
THG  
FHG  
Diodes  
Ti:Sa, OPOs, OPAs  
USP

## Filter P1L09



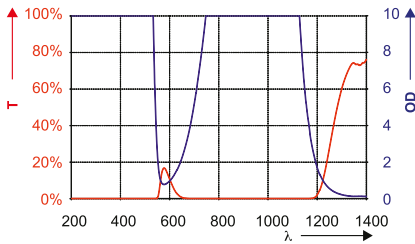
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 35%

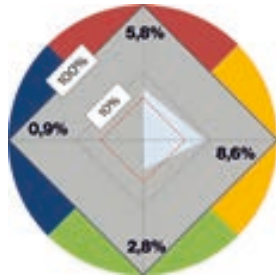
### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
THG  
FHG  
Diodes  
Ti:Sa, OPOs, OPAs  
CO<sub>2</sub>  
USP

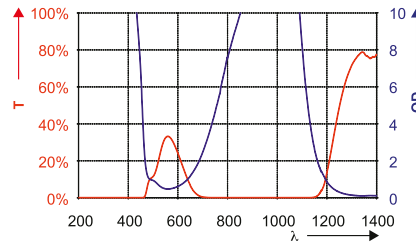
### Transmission-/OD Curve



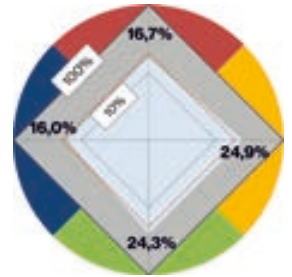
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...P1L07	180 -315 nm	>315 -534 nm	>534 -540 nm	>540 -545 nm	630 -660 nm	660 -680 nm	680 -700 nm	700 -715 nm	715 -725 nm	725 -735 nm
OD	10+	8+	6+	3+	1+	2+	3+	4+	5+	6+
F18/F22F42	D LB10 I LB4 R LB4 M LB6	D LB6 I LB8 R LB8 M LB8	D LB6 I LB6 R LB6 M LB6	D LB3 I LB3 R LB3 M LB3	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6
Frame Art.No. ...P1L07	735 -745 nm	745 -755 nm	755 -1120 nm	>1120 -1130 nm	>1130 -1135 nm	>1135 -1145 nm	>1145 -1155 nm	>1155 -1165 nm	>1165 -1180 nm	>1180 -1210 nm
OD	7+	8+	9+	7+	6+	5+	4+	3+	2+	1+
F18/F22F42	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8	D LB6 I LB8 R LB8 M LB9	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1

### Protection levels

Frame Art.No. ...P1L09	180 -315 nm	>315 -450 nm	>450 -460 nm	650 -690 nm	690 -725 nm	725 -745 nm	745 -760 nm	760 -775 nm	775 -790 nm	790 -810 nm
OD	9+	5+	3+	1+	2+	3+	4+	5+	6+	7+
F18/F22/F42	D LB9 I LB4 R LB4 M LB6	D LB5 I LB5 R LB5 M LB5	D LB3 I LB3 R LB3 M LB3	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7
F29	D LB9 I LB4 R LB4 M LB6	D LB5 I LB5 R LB5 M LB5	D LB3 I LB3 R LB3 M LB3	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7
Frame Art.No. ...P1L09	810 -1090 nm	>1090 -1100 nm	>1100 -1110 nm	>1110 -1120 nm	650 -680 nm	690 -700 nm				
OD	8+	7+	6+	5+	2+	3+				
F18/F22/F42	D LB6 I LB8 R LB7 M LB8Y	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	0,01W 2x10E-6J	0,1W 2x10E-5J				
F29	D LB6 I LB8 R LB7 M LB8Y	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	0,01W 2x10E-6J	0,1W 2x10E-5J				

# Plastic Filters for Laser Safety Eyewear

## P1L10



### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 40%

### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
SHG  
THG  
FHG  
Diodes  
USP

## Filter P1L12



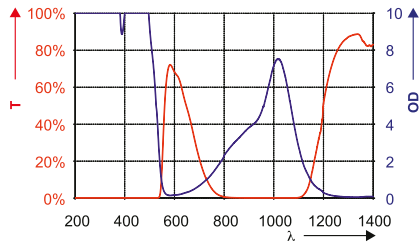
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 25%

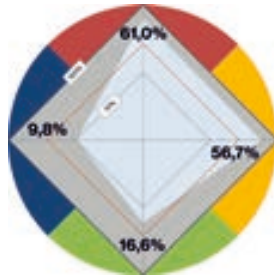
### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
THG  
FHG  
Diodes  
Ti:Sa, OPOs, OPAs  
USP

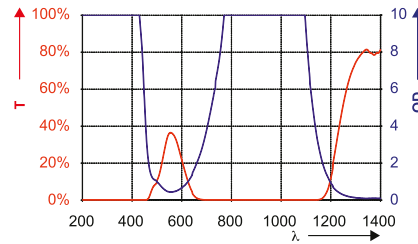
### Transmission-/OD Curve



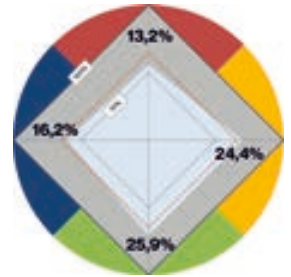
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... P1L10	180 -315 nm	>315 -500 nm	>500 -532 nm	800 -<975 nm	975 -1070 nm
OD	8+	6+	4+	2+	4+
F18/F22/F42	D LB8 I LB4 R LB4 M LB6	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4	D LB2 I LB2 R LB2 M LB2	D LB4 I LB4 R LB4 M LB4
F29	D LB8 I LB4 R LB4 M LB6	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4	D LB2 I LB2 R LB2 M LB2	D LB4 I LB4 R LB4 M LB4

### Protection levels

Frame Art.No. ... P1L12	180 -315 nm	>315 -445 nm	705 -<720 nm	720 -<735 nm	735 -<745 nm	745 -<755 nm	755 -1100 nm	630 -650 nm
OD	9+	6+	4+	5+	6+	7+	8+	OD1-2
F18/F22/F42	D LB9 I LB4 R LB4 M LB6Y	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8Y	0,01W 2×10E-6J RB1
F29	D LB9 I LB4 R LB4 M LB6Y	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8Y	0,01W 2×10E-6J RB1
F46	D LB9 I LB4 R LB4 M LB6Y	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8Y	0,01W 2×10E-6J RB1
F47	D LB9 I LB4 R LB4 M LB6Y	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8Y	0,01W 2×10E-6J RB1

## Filter P1L13



### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 20%

### Typical Lasers

Diodes

## Filter P1L15



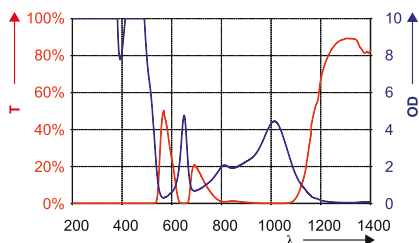
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 25%

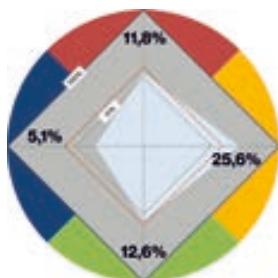
### Typical Lasers

Diodes

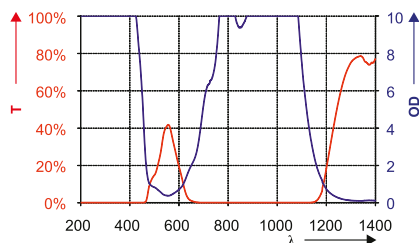
### Transmission-/OD Curve



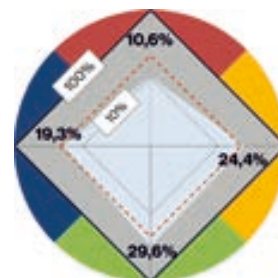
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... P1L13	180 -315 nm	>315 -532 nm	638 -661 nm	790 -<960 nm	960 -1070 nm	>1070 -1090 nm	529 -532 nm	>532 -538 nm	>538 -545 nm	620 -631 nm
OD	3+	3+	3+	2+	3+	2+	3-4	2-3	1-2	1-2
F18/F22/F42	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	1W 2x10E-4J RB3	0,1W 2x10E-5J RB2	0,01W 2x10E-6J RB1	0,01W 2x10E-6J RB1
F29	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	1W 2x10E-4J RB3	0,1W 2x10E-5J RB2	0,01W 2x10E-6J RB1	0,01W 2x10E-6J RB1

### Protection levels

Frame Art.No. ... P1L15	180 -315 nm	>315 -450 nm	>450 -460 nm	<650 -<680 nm	620 -650 nm	680 -<690 nm	690- <700 nm	700 -<720 nm	720 -<755 nm	755 -1090 nm
OD	9+	5+	3+	1+	2+	3+	4+	5+	6+	7+
F18/F22/F42	D LB9 I LB4 R LB4	D LB5 I LB5 R LB5	D LB3 I LB3 R LB3	D LB1 I LB1 R LB1	D LB2 I LB2 R LB2	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB6 I LB7 R LB7
F29	D LB9 I LB4 R LB4	D LB5 I LB5 R LB5	D LB3 I LB3 R LB3	D LB1 I LB1 R LB1	D LB2 I LB2 R LB2	D LB3 I LB3 R LB3	D LB4 I LB4 R LB4	D LB5 I LB5 R LB5	D LB6 I LB6 R LB6	D LB6 I LB7 R LB7

Frame Art.No. ... P1L13	631 -<638 nm	638 -644 nm	656 -661 nm	>661 -666 nm	>666 -674 nm
OD	2-3	3-4	3-4	2-3	1-2
F18/F22/F42	0,1W 2x10E-5J RB2	1W 2x10E-4J RB3	1W 2x10E-4J RB3	0,1W 2x10E-5J RB2	0,01W 2x10E-6J RB1
F29	0,1W 2x10E-5J RB2	1W 2x10E-4J RB3	1W 2x10E-4J RB3	0,1W 2x10E-5J RB2	0,01W 2x10E-6J RB1

Frame Art.No. ... P1L15	620 -635 nm	650 -665 nm
OD	1-2	2-3
F18/F22/F42	0,01W 2x10E-6J RB1	0,1W 2x10E-5J RB2
F29	0,01W 2x10E-6J RB1	0,1W 2x10E-5J RB2

# Plastic Filters for Laser Safety Eyewear

## Filter P1L16



### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 25%

### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
SHG  
THG  
FHG  
Diodes  
USP

## Filter P1M01



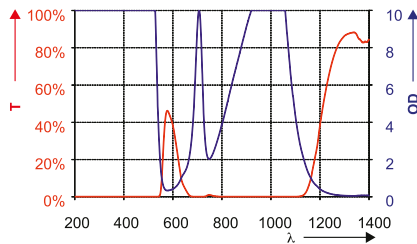
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 35%

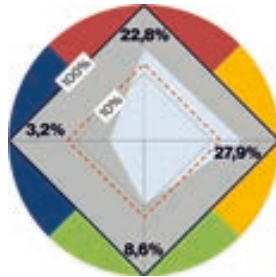
### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
THG  
FHG  
Diodes  
Ti:Sa, OPOs, OPAs  
CO<sub>2</sub>  
USP  
Telekom

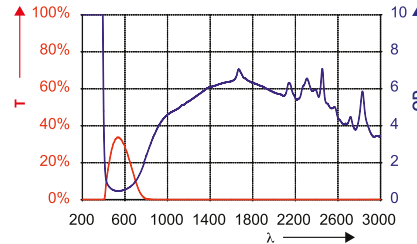
### Transmission-/OD Curve



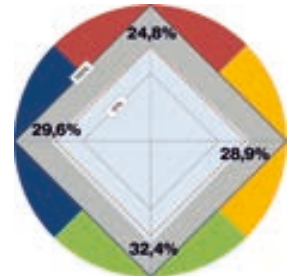
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... P1L16	180 -315 nm	>315 -532 nm	>532 -535 nm	690 -694 nm	694 -715 nm	808 -890 nm	890 -1064 nm	>1064 -1075 nm	>1075 -1080 nm	640 -655 nm
OD	10+	8+	6+	6+	8+	4+	8+	7+	6+	1-2
F18/F22/F42	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB8Y	D LB6 I LB6 R LB6 M LB6	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB8 M LB7	D LB4 I LB4 R LB4 M LB4	D LB6 I LB8 R LB8 M LB8Y	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	0,01W 2x10E-6J RB1
F46	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB8Y	D LB6 I LB6 R LB6 M LB6	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB8 M LB7	D LB4 I LB4 R LB4 M LB4	D LB6 I LB8 R LB8 M LB8Y	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	0,01W 2x10E-6J RB1

### Protection levels

Frame Art.No. ... P1M01	180 -315 nm	>315 -385 nm	>385 -400 nm	780 -840 nm	840 -920 nm	920 -1400 nm	>1400 -2550 nm	>2550 -3600 nm	>3600 -5200 nm	>5200 -14000 nm
OD	10+	8+	4+	2+	3+	4+	4+	3+	2+	4+
F18/F22/F42	D LB10 I LB4 R LB4 M LB6	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3Y M LB3	D LB2 I LB2 R LB2 M LB2	D LB4 I LB4 R LB3Y M LB4Y
F46	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB8Y	D LB4 I LB4 R LB4 M LB4	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3Y M LB3	D LB2 I LB2 R LB2 M LB2	D LB4 I LB4 R LB3Y M LB4Y



# Plastic Filters for Laser Safety Eyewear

## P1P10



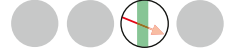
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 16%

### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
THG  
FHG  
Diodes  
CO<sub>2</sub>  
USP

## Filter P1P15



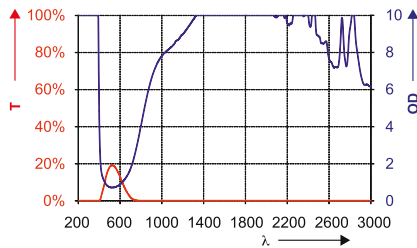
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 2%

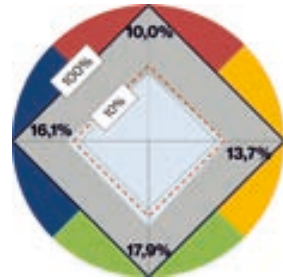
### Typical Lasers

Diodes

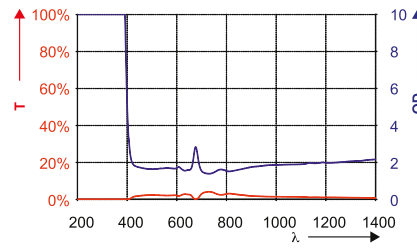
### Transmission-/OD Curve



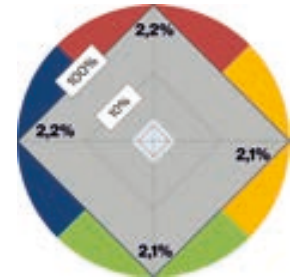
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ...P1P10	>180 -315 nm	>315 -385 nm	>385 -400 nm	635 -<720 nm	720 -<770 nm	770 -<800 nm	800 -<840 nm	840 -<880 nm	880 -<960 nm	960 -<1030 nm
OD	10+	8+	4+	1+	2+	3+	4+	5+	6+	7+
F18/F22/F42	D LB10 I LB4 R LB4 M LB6	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7
F29	D LB10 I LB4 R LB4 M LB6	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7
F47	D LB10 I LB4 R LB4 M LB6	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB4 M LB4	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7
Frame Art.No. ...P1P10	1030 -1400 nm	>1400 -3600 nm	>3600 -5250 nm	>5250 -14000 nm	635 -690 nm					
OD	8+	4+	3+	5+	1-2					
F18/F22/F42	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB3Y M LB4	D LB3 I LB3 R LB3Y M LB3	D LB4 I LB4 R LB3Y M LB5Y	0,01W 2x10E-6J RB1					
F29	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB3Y M LB4	D LB3 I LB3 R LB3Y M LB3	D LB4 I LB4 R LB3Y M LB5Y	0,01W 2x10E-6J RB1					
F47	D LB6 I LB8 R LB8 M LB8	D LB4 I LB4 R LB3Y M LB4	D LB3 I LB3 R LB3Y M LB3	D LB4 I LB4 R LB3Y M LB5Y	0,01W 2x10E-6J RB1					

### Protection levels

Frame Art.No. ...P1P15	180 -315 nm	>315 -384 nm	>384 -388 nm	>388 -392 nm	>392 -396 nm	>396-400 nm	>400 -415 nm	>415 -1400 nm	5250 -14000 nm
OD	10+	8+	7+	6+	4+	3+	2+	1+	4+
F18/F22/F42	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB7Y	D LB6 I LB7 R LB7 M LB7Y	D LB6 I LB6 R LB6 M LB6	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1	D LB4 I LB4 R LB3Y
Frame Art.No. ...P1P15	410 -420 nm	>420 -664 nm	>664 -688 nm	>688 -700 nm					
OD	2-3	1-2	2-3	1-2					
F18/F22/F42	0,1W 2x10E-5J RB2	0,01W 2x10E-6J RB1	0,1W 2x10E-5J RB2	0,01W 2x10E-6J RB1					

# Plastic Filters for Laser Safety Eyewear

## Filter P1P17



### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 25%

### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
SHG  
THG  
FHG  
Diodes  
CO<sub>2</sub>  
USP

## Filter P1P18



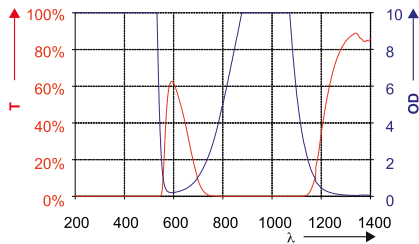
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 47%

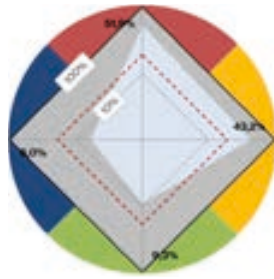
### Typical Lasers

Nd:YAG  
Fiber laser  
Disc laser  
THG  
FHG  
Diodes  
CO<sub>2</sub>  
USP

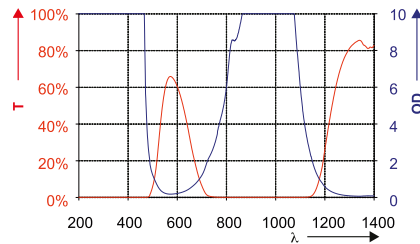
### Transmission-/OD Curve



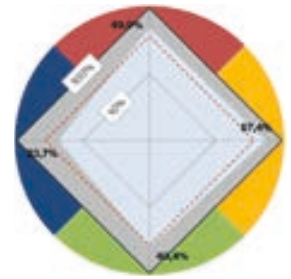
### Transmission of Signal Colours



### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ..._P1P17	180 -315 nm	>315 -532 nm	>532 -535 nm	>535 -539 nm	>539 -541 nm	>541 -545 nm	785 -<800 nm	800 -<816 nm	816 -<835 nm	835 -<850 nm
OD	10+	10+	8+	6+	5+	3+	4+	5+	6+	7+
F18/F22/F42	D LB10 I LB4 R LB4 M LB6Y	D LB6 I LB8 R LB8 M LB10	D LB6 I LB8 R LB8 M LB8	D LB6 I LB5 R LM6 M LB6	D LB5 I LB3 R LB5 M LB5	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7

Frame Art.No. ..._P1P17	850 -<880 nm	880 -1070 nm	>1070 -1080 nm	>1080 -1087 nm	>1087 -1096 nm	>1096 -1105 nm	>1105 -1113 nm	>1113 -1125 nm	5250 -14000 nm	10600 nm
OD	8+	10+	8+	7+	6+	5+	4+	3+	5+	8+
F18/F22/F42	D LB6 R LB8 I LB8 M LB8	D LB6 I LB8 R LB8 M LB10	D LB6 I LB8 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB3Y M LB3Y	D LB4 I LB4 R LB3Y M LB3Y

### Protection levels

Frame Art.No. ..._P1P18	185 -315 nm	>315 -466 nm	>466 -468 nm	>468 -470 nm	>470 -472 nm	>472 -475 nm	780 -<795 nm	795 -<800 nm	800 -<813 nm	813 -<847 nm	847 -<864 nm
OD	10+	8+	7+	6+	5+	4+	4+	5+	6+	7+	8+
F18/F22/F42	D LB10 I LB4 R LB4 M LB6	D LB6 I LB8 R LB8 M LB8Y	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB6 I LB7 R LB7 M LB7	D LB6 I LB8 R LB8 M LB8

Frame Art.No. ..._P1P18	864 -<880 nm	880 -1070 nm	>1070 -1075 nm	>1075 -1080 nm	>1080 -1087 nm	>1087 -1100 nm	>1100 -1108 nm	>1108 -1115 nm	5250 -14000 nm	10600 nm
OD	9+	10+	9+	8+	7+	6+	5+	4+	5+	8+
F18/F22/F42	D LB6 I LB8 R LB8 M LB9	D LB6 I LB8 R LB8 M LB10	D LB6 I LB8 R LB8 M LB9	D LB6 I LB8 R LB8 M LB8	D LB6 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB3Y M LB3Y	D LB4 I LB4 R LB3Y M LB3Y

# Plastic Filters for Laser Safety Eyewear

## Filter P1P20



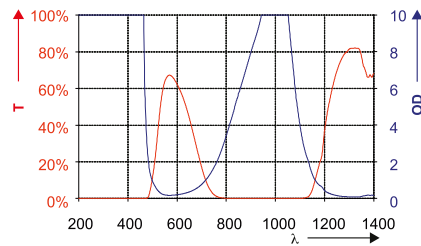
### Filter Properties

**Filter Technology:** Absorption Filter  
**VLT (approx.):** 52%

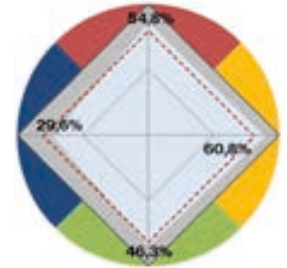
### Typical Lasers

- Nd:YAG
- Fiber laser
- Disc laser
- THG
- FHG
- Diodes
- CO<sub>2</sub>
- USP

### Transmission-/OD Curve



### Transmission of Signal Colours



### Protection levels

Frame Art.No. ... P1P20	180-315	>315-462	>462-464	>464-466	>466-469	>469-472	>472-475	>475-480	>480-490	735-780 <-780	780-800	800-830	830-850	850-880	880-910	910-940	940-955	955-975	975-1035	>1035-1045	>1045-1055	>1055-1064	>1064-1075
OD	10+	8+	6+	6+	4+	4+	1+	1+	1+	1+	1+	1+	4+	4+	6+	7+	8+	8+	8+	8+	8+	7+	6+
R01	D LB10 IRLB4 R LB4 M LB6Y	D LB7 I LB8 R LB8 M LB8Y	D LB6 I LB6 R LB6 M LB6	D LB6 I LB4 R LB4 M LB4	D LB4 I LB4 R LB4 M LB4	D LB4 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB4 M LB4	D LB6 I LB6 R LB6 M LB6	D LB7 I LB7 R LB7 M LB7	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6
OD	10+	8+	7+	6+	5+	4+	3+	2+	1+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	9+	8+	7+	6+
R14	D LB10 IRLB4 R LB4 M LB6Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB2 I LB2 R LB2 M LB2	D LB3 I LB3 R LB3 M LB3	D LB4 I LB4 R LB4 M LB4	D LB5 I LB5 R LB5 M LB5	D LB6 I LB6 R LB6 M LB6	D LB7 I LB7 R LB7 M LB7	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6
OD	10+	8+	6+	6+	4+	4+	1+	1+	1+	1+	1+	1+	4+	4+	6+	7+	8+	8+	8+	8+	8+	7+	6+
R17	D LB10 IRLB4 R LB4 M LB6Y	D LB7 I LB8 R LB8 M LB8Y	D LB6 I LB6 R LB6 M LB6	D LB6 I LB4 R LB4 M LB4	D LB4 I LB4 R LB4 M LB4	D LB4 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB4 I LB4 R LB4 M LB4	D LB4 I LB4 R LB4 M LB4	D LB6 I LB6 R LB6 M LB6	D LB7 I LB7 R LB7 M LB7	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB8 R LB8 M LB8Y	D LB7 I LB7 R LB7 M LB7	D LB6 I LB6 R LB6 M LB6
Frame Art.No. ... P1P20	>1075-1084	>1084-1095	>1095-1105	>1105-1120	>1120-1150	3945-5180	5180-11500	>11500-25000															
OD	5+	4+	1+	1+	1+	4+	7+	7+															
R01	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB4 I LB4 R LB3Y M LB1	D LB5 I LB5Y R LB3Y M LB1	D LB5 I LB5Y R LB3Y M LB1															
OD	5+	4+	3+	2+	1+	4+	5+	5+															
R14	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB3 I LB3 R LB3 M LB3	D LB2 I LB2 R LB2 M LB2	D LB1 I LB1 R LB1 M LB1	D LB4 I LB4 R LB3Y M LB1	D LB5 I LB5Y R LB3Y M LB1	D LB5 I LB5Y R LB3Y M LB1															
OD	5+	4+	1+	1+	1+	4+	5+																
R17	D LB5 I LB5 R LB5 M LB5	D LB4 I LB4 R LB4 M LB4	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB1 I LB1 R LB1 M LB1	D LB4 I LB4 R LB3Y M LB1	D LB5 I LB5Y R LB3Y M LB1																

# Mineral Glass Laser Safety Windows

**RENISHAW** 

RenAM 500Q



RENISHAW



RenAM 500Q



Mineral glass laser safety windows are commonly used as observation windows in medium and high power laser applications, such as welding, cutting, drilling, and additive manufacturing, and – when designed accordingly – allow visual process observation without the need for laser safety eyewear.

In many cases, our mineral glass windows are made of a glass laminate composed of the laser safety filter itself and an additional layer of neutral glass. In the event of a direct laser hit or damage, this design prevents broken glass from falling out – similar to how a car windscreen reacts.

For quality reasons, the maximum possible dimension for a single piece is limited to 210 × 297 mm. However, for larger areas, lattice window structures can be manufactured according to customer requirements.

Mineral glass laser safety windows continue to provide higher levels of protection than their plastic counterparts in many cases and are particularly advantageous in NIR and IR applications as their excellent daylight transmission and low colouration mean that they offer exceptional colour recognition.

In order to meet the growing requirements in industry and research, laservision offers mineral glass windows with certification in the IR range up to 25 µm.

**laservision**  
**laser safety windows**  
**made of mineral glass**  
These are available on our  
website:

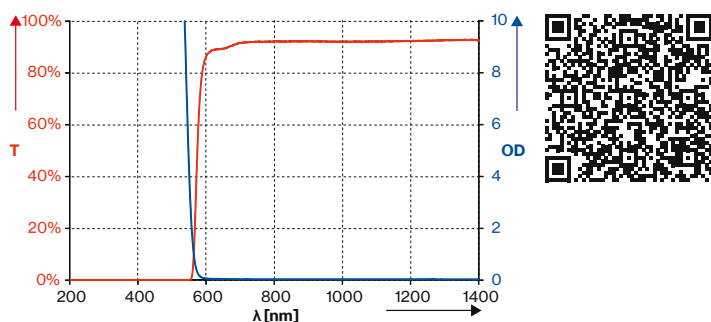


## Window T1E02



- Filter for Nd:YAG lasers at 266, 355 or 532nm
- High protection levels
- Max. dimension: 297 × 210mm

Transmission-/OD Curve T1E02\*\*



Window	T1E02
Colour	Orange
Filter Material	Mineral Glass
Filtertechnology	Absorption Filter
Certification	CE
VLT (approx.)	40%
Visual Brightness	Good
Colour View	Limited
Filter Thickness	approx. 5–6mm*

Protection according to DIN EN 60825-4:2011				∅ 50mm
5–6mm	200–532nm	203 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s

Wavelength	[nm]	OD	Protection level {10 sec.}
180–315		10+	D LB10 + IR LB5 + M LB5Y
>315–532		8+	D LB7 + IR LB8 + M LB8Y

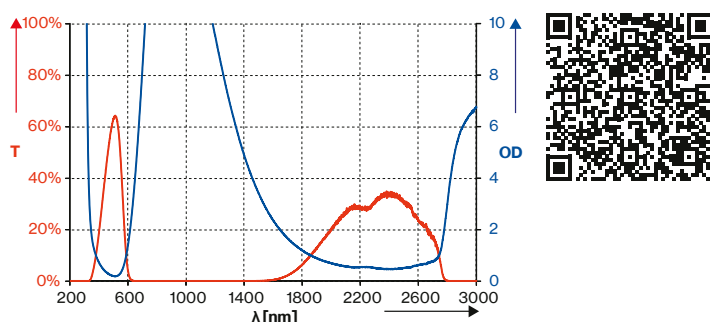
Dimension	[mm]	Art. Number
	200 × 100	000.T1E02.1001
	297 × 210	000.T1E02.1002

## Window T1K01



- Broadband-filter for IR diodes, disc and fibre lasers
- High protection levels
- Max. dimension: 297 × 210mm

Transmission-/OD Curve T1K01\*\*



Window	T1K01
Colour	Green/Blue
Filter Material	Mineral Glass
Filtertechnology	Absorption Filter
Certification	CE
VLT (approx.)	45%
Visual Brightness	Good
Colour View	Sufficient
Filter Thickness	approx. 5–8mm*

Protection according to DIN EN 60825-4:2011				∅ 52mm
	750–1200nm	167 kW/m <sup>2</sup> v	T2	t <sub>max</sub> =217s
	3950–25000nm	221 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s

Wavelength	[nm]	OD	Protection level {5 sec.}	Protection level {10 sec.}
647–689		3+	DIRM LB3	DIRM LB3
690–749		6+	DIRM LB6	DIRM LB6
750–1200		8+	D LB7 + IR LB8 + M LB8Y	D LB7 + IR LB8 + M LB8Y
>1200–1320		6+	DIRM LB6	DIRM LB6
>1320–1400		3+	DIRM LB3	DIRM LB3
>1400–1520		3+	DIRM LB3	DIRM LB3
>1520–1550		2+	DIRM LB2	DIRM LB2
9000–11000		5+	DI LB4	DI LB3

Dimension	[mm]	Art. Number
	200 × 100	000.T1K01.1001
	297 × 210	000.T1K01.1002

# Mineral Glass

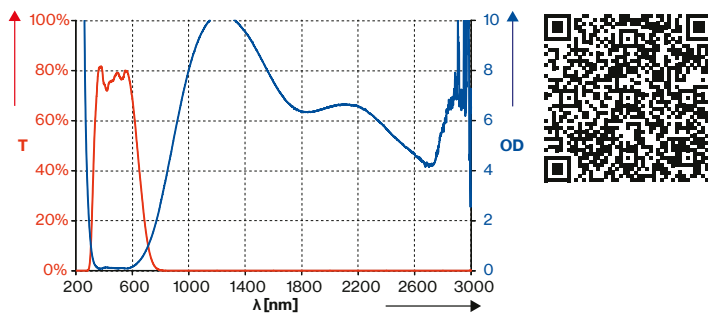
## Laser Safety Windows

### Window T1K02



- Standard filter for IR laser, disc and fibre lasers
- High VLT

Transmission-/OD Curve T1K02\*\*



Window	T1K02
Colour	Light Grey
Filter Material	Mineral Glass
Filter technology	Absorption Filter
Certification	CE
VLT (approx.)	70%
Visual Brightness	Very Good
Colour View	Excellent
Filter Thickness	approx. 5–6 mm*

Protection according to DIN EN 60825-4:2011				Ø 50 mm
	950–1399 nm	143 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105 s
	3000–25000 nm	221 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105 s

Wavelength	[nm]	OD	Protection level {10 sec.}
950–1000		5+	DIR LB5
>1000–1050		7+	D LB6 + IR LB7
>1050–1400		8+	D LB6 + IR LB8
>1400–2700		4+	D LB4 + IR LB3
>2700–3000		4+	DI LB4
5400		4+	DI LB4
10600		4+	DI LB4

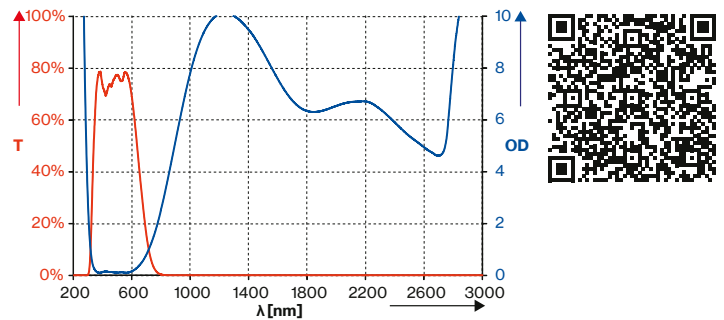
Dimension	[mm]	Art. Number
	200×100	000.T1K02:1001

### Window T1K03



- High power filter for IR laser, disc and fibre lasers
- High protection rating

Transmission-/OD Curve T1K03\*\*



Window	T1K03
Colour	Light Grey
Filter Material	Mineral Glass
Filter technology	Absorption Filter
Certification	CE
VLT (approx.)	66%
Visual Brightness	Very Good
Colour View	Excellent
Filter Thickness	approx. 5–8 mm*

Protection according to DIN EN 60825-4:2011				Ø 50 mm
	1000–2100 nm	265 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105 s
	3000–25000 nm	284 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105 s

Wavelength	[nm]	OD	Protection level {10 sec.}
900 – 1000		4+	DIRM LB4
>1000–1050		7+	DIRM LB7
>1050–1400		8+	D LB7 + IR LB8 + M LB8Y
>1400–2100		5+	DI LB5 + R LB3Y + M LB3
>2100–25000		4+	DI LB4 + R LB3Y + M LB4

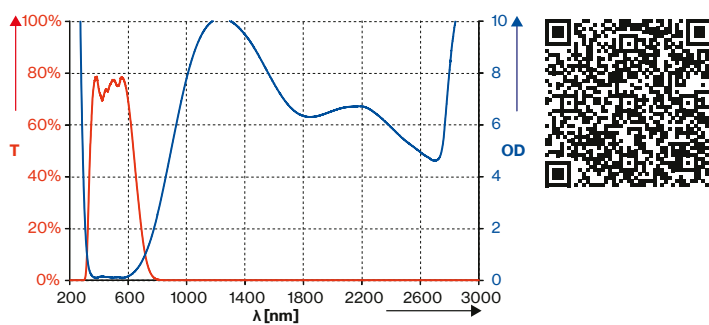
Dimension	[mm]	Art. Number
	200×100	000.T1K03:1001
	297×210	000.T1K03:1002

## Window T2K03



- High power filter for IR laser, disc and fibre lasers
- High protection rating
- High daylight transmission (VLT)
- No neutral glass lamination

### Transmission-/OD Curve T2K03\*\*



Window	T2K03
Colour	Light Grey
Filter Material	Mineral Glass
Filtertechnology	Absorption Filter
Certification	CE
VLT (approx.)	66%
Visual Brightness	Very Good
Colour View	Excellent
Filter Thickness	approx. 5–6 mm*

Protection according to DIN EN 60825-4			
1000–2100nm	61 kW/m <sup>2</sup>	T3	t <sub>max</sub> =10,5s

Wavelength	[nm]	OD
900 – 1000		4+
>1000–1050		7+
>1050–1400		8+
>1400–2100		4+
>2100–25000		4+
>3000–11500		5+

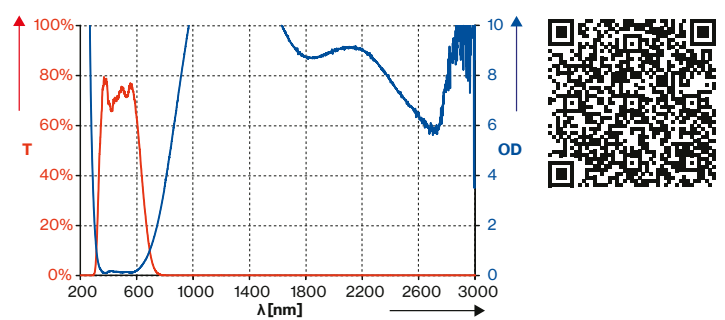
Dimension	[mm]	Art. Number
	200×100	000.T2K03.1001
	297×210	000.T2K03.1002

## Window T1K06



- Filter for short pulse IR lasers
- M protection rating
- High daylight transmission (VLT)

### Transmission-/OD Curve T1K06\*\*



Window	T1K06
Colour	Light Grey
Filter Material	Mineral Glass
Filtertechnology	Absorption Filter
Certification	CE
VLT (approx.)	60%
Visual Brightness	Very Good
Colour View	Excellent
Filter Thickness	approx. 6–7 mm*

Protection according to DIN EN 60825-4:2011				Ø 50mm
950 – 1399nm	143 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	
3000–25000nm	221 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	

Wavelength	[nm]	OD	Protection level {10 sec.}
730 – <780		1+	DIRM LB1
780 – <808		2+	DIRM LB2
808 – 840		3+	DIRM LB3
>840 – 870		4+	DIRM LB4
>870 – 885		5+	DIRM LB5
>885 – 900		6+	DIRM LB6
>900 – 950		7+	DIRM LB7
>950 – 1000		8+	D LB7 + IRM LB8
>1000 – 1400		9+	D LB7 + IR LB8 + M LB9
>1400 – 3500		5+	DI LB5 + RM LB4
>3500 – 25000		10+	DI LB5 + R LB3Y + M LB5

Dimension	[mm]	Art. Number
	200×100	000.T1K06.1001
	297×210	000.T1K06.1002

# Mineral Glass

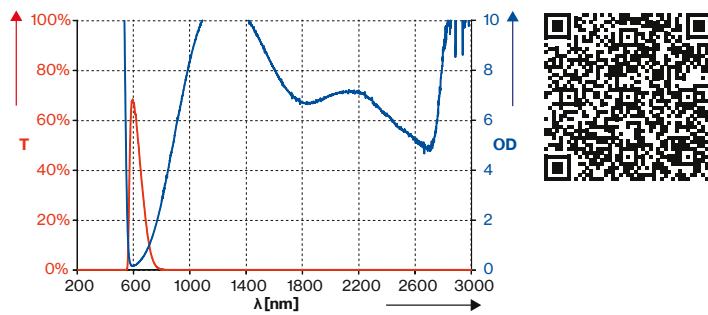
## Laser Safety Windows

### Window T1M01



- Broadband IR, UV and green filter
- M-ratings for ultrashort pulsed lasers (USP)
- Good daylight transmission (VLT)

Transmission-/OD Curve T1M01\*\*



Window	T1M01
Colour	Orange
Filter Material	Mineral Glass
Filtertechnology	Absorption Filter
Certification	CE
VLT (approx. )	25%
Visual Brightness	Good
Colour View	Slightly Limited
Filter Thickness	approx. 8–13mm*

Protection according to DIN EN 60825-4:2011				Ø 50mm
200–532nm	203 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	
890–1400nm	265 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	
3000–25000nm	409 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	

Wavelength [nm]	OD	Protection level {10 sec.}
180 – 315	10+	D LB10 + IR LB5
>315–532	8+	D LB7 + IR LB8 + M LB8Y
808–<890	3+	DIRM LB3
890–<940	5+	DIRM LB5
940–<1000	6+	DIRM LB6
1000–<1025	7+	DIR LB7 + M LB7Y
1025–<1100	9+	D LB7 + I LB9 + R LB8 + M LB8Y
>1100–1400	8+	D LB7 + IR LB8 + M LB8Y
>1400–3000	4+	DI LB4
>3000–11500	5+	DI LB5

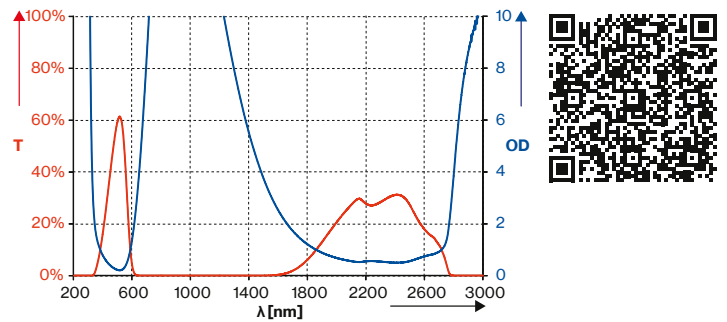
Dimension [mm]	Art. Number
200 x 100	000.T1M01.1001
297 x 210	000.T1M01.1002

### Window T1Q01



- Broadband filter for pump diodes, YAG- and IR-lasers
- M-protection rating
- Alignment filter for 633nm

Transmission-/OD Curve T1Q01\*\*



Window	T1Q01
Colour	Green
Filter Material	Mineral Glass
Filtertechnology	Absorption Filter
Certification	CE
VLT (approx. )	35%
Visual Brightness	Sufficient
Colour View	Slightly Limited
Filter Thickness	approx. 7mm*

Protection according to DIN EN 60825-4:2011				Ø 50mm
690–1320nm	212 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	
3000–25000nm	221 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	

Wavelength [nm]	OD	Protection level {5 sec.}	Protection level {10 sec.}
690 - 795	7+	DIRM LB7	D LB6 + IRM LB7
>795 - 1100	9+	DIR LB7 + M LB9	D LB6 + IR LB7 + M LB9Y
>1100 - 1200	8+	DIR LB7 + M LB8	D LB6 + IR LB7 + M LB8
>1200 - 1320	7+	DIRM LB7	D LB6 + IRM LB7
>1320 - 1400	3+	DIRM LB3	DIRM LB3
>1400 - 1550	3+	DIR LB3	DIR LB3
10600	4+	DI LB4	DI LB4
633	2–3	0,1W 2*10-5J RB2	

Dimension [mm]	Art. Number
200×100	000.T1Q01.1001

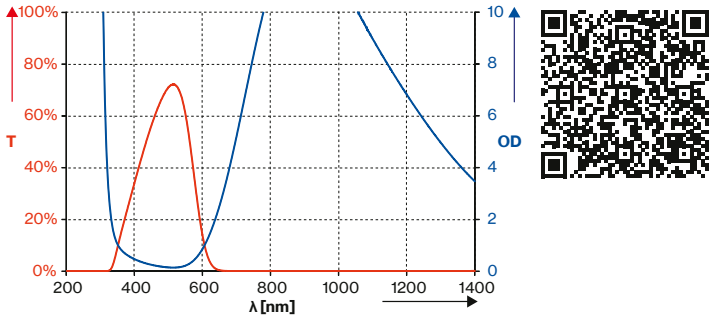


## Window T1Q03



- Filter for pump diodes, YAG, fibre and disc lasers
- M protection rating
- Alignment filter for 630-635 nm

Transmission-/OD Curve T1Q03\*\*



<b>Window</b>	<b>T1Q03</b>		
<b>Colour</b>	Green		
<b>Filter Material</b>	Mineral Glass		
<b>Filtertechnology</b>	Absorption Filter		
<b>Certification</b>	CE		
<b>VLT (approx.)</b>	45%		
<b>Visual Brightness</b>	Sufficient		
<b>Colour View</b>	Slightly Limited		
<b>Filter Thickness</b>	approx. 4–5mm*		
<b>Protection according to DIN EN 60825-4:2011</b> <span style="float: right;">Ø 50mm</span>			
	750–1290nm	174 kW/m <sup>2</sup>	T2 <span style="float: right;">t<sub>max</sub>=105s</span>
<b>Wavelength</b>	<b>[nm]</b>	<b>OD</b>	<b>Protection level {5 sec.} {10 sec.}</b>
	750 – 800	8+	D LB6 + IRM LB8
	>800 – 1064	9+	D LB6 + IR LB8 + M LB9
	>1064–1100	8+	D LB6 + IRM LB8
	>3000–25000	4+	DI LB4 + R LB3Y + M LB4Y
	630–635	1-2	0,01W2x10E–6J RB1
<b>Dimension</b>	<b>[mm]</b>	<b>Art. Number</b>	
	200×100	000.T1Q03.1001	

## Laser Safety Training

The growing number of laser applications makes laser safety more and more important. Therefore laserservice is offering a sophisticated, modular education and training concept for laser safety, which is centred on the Laser Safety Officer LSO course. These training courses are held in close cooperation with the uvex academy and include the Laser safety awareness course, an Advanced training, a Hands-on training and the Measurement course.

All courses are held in close cooperation with our partners i.e. the Bavarian Laser Centre BLZ at the uvex academy in Fuerth. On request and with a fair number of participants provided all courses can be held also at universities, institutes, or corporate clients.



# Plastic Laser Safety Windows



With developments made in absorbing dyes and plastics processing, plastic laser safety windows have become increasingly popular in recent years. The main advantages of these products compared to “conventional” mineral glass laser safety windows is the availability of larger sheets (up to 2m x 3m), their lower weight and price, and how easy they are to machine. To take into account the realities of working with laser processing machines today, virtually all laservision plastic laser safety windows are certified in accordance with EN 60825-4. In addition, for product comparison most of our windows are still tested additionally 10 seconds according to EN 207.

## PC vs. PMMA – the materials and properties of plastic windows

laservision not only uses well-established PMMA, but also PC with a scratch-resistant coating.

### PC laser safety windows

- Manufactured using an extrusion process, so relatively large batch sizes are required
- Very low thickness tolerance of +/- 5%
- Because PC is very sensitive, an anti-scratch coating is added to provide excellent protection against scratches as well as many chemicals
- Suitable for use at higher temperatures – up to 100°C continuously or 120°C for short periods of time

### PMMA laser safety windows

- Manufactured using a casting process, so relatively small batch sizes are also possible
- Sufficiently resistant to scratches so can be used without an additional coating
- Relatively low softening temperature, should not be exposed to temperatures higher than 50°C continuously or 60°C for short periods of time

laservision  
laser safety windows  
made of plastic  
These are available on our  
website:

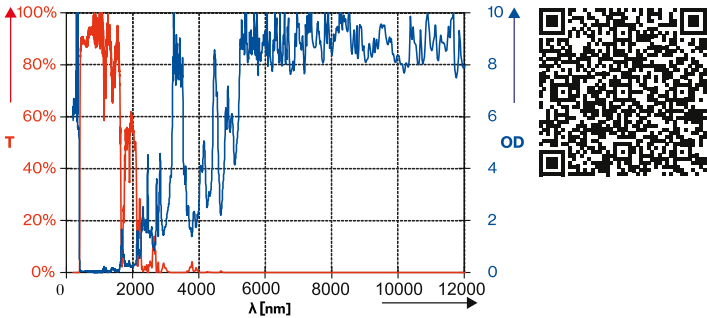


## Window P1D01



- CO<sub>2</sub> filter for medium power
- Excellent colour recognition
- CE / EN 60825-4
- Max. dimension: 3000 × 2000 mm

### Transmission-/OD Curve P1D01\*\*



<b>Window</b>	<b>P1D01</b>
<b>Colour</b>	Colourless
<b>Certification</b>	CE
<b>VLT (approx. )</b>	90%
<b>Visual Brightness</b>	Excellent
<b>Colour View</b>	Unrestricted
<b>Filter Thickness</b>	approx. 6mm

Protection according to DIN EN 60825-4:2011				
6mm	4700–25000nm	103 kW/m <sup>2</sup>	T2	T <sub>max.</sub> =105s

Wavelength [nm]	OD	Protection level {10 sec.}
180–315	10+	D LB10 + IR LB4 + M LB6Y
>315–371	6+	D LB4 + I LB3
4765–25000	10+	D LB5 + R LB3Y + M LB6Y

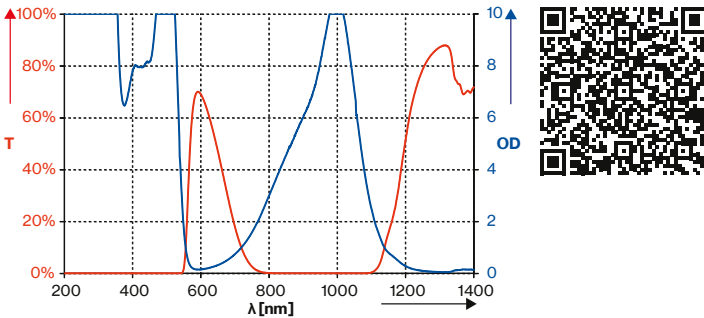
Dimension [mm]	Art. Number
200×100	000.P1D01.1001
297×210	000.P1D01.1002
450×300	000.P1D01.1006
600×450	000.P1D01.1007

## Window P1L03



- Standard filter for UV and 532 nm Nd:YAG laser
- Suitable für diode pumped Nd:YAG laser
- Max. dimension: 1219 × 915 mm

### Transmission-/OD Curve P1L03\*\*



<b>Window</b>	<b>P1L03</b>
<b>Colour</b>	Red/Brown
<b>Certification</b>	OD
<b>VLT (approx. )</b>	26%
<b>Visual Brightness</b>	Sufficient
<b>Colour View</b>	Slightly Limited
<b>Filter Thickness</b>	approx. 3mm

Wavelength [nm]	OD	Certified protection levels acc. to DIN 207
180 - 350	OD10+	D LB6 + R LB3 + M LB6Y
>350 - <410	OD6+	D LB6 + R LB3 + M LB5Y
410 - <460	OD7+	DIR LB5
>460 - 528	OD8+	
>528 - 530	OD7+	
>530 - 532	OD6+	
>532 - 535	OD5+	
>535 - 540	OD4+	
770 - <800	OD2+	
800 - <830	OD3+	
830 - <870	OD4+	
870 - <910	OD5+	
910 - <940	OD6+	
940 - <970	OD7+	
970 - 1030	OD8+	
>1030 - 1044	OD7+	
>1044 - 1050	OD6+	
>1050 - 1068	OD5+	
>1068 - 1078	OD4+	
>1078 - 1090	OD3+	
5400 - <10600	OD5+	
10600 - 11000	OD6+	

For the above mentioned protection levels, the laser exposure tests were carried out according to EN207 and confirmed by the independent Notified Body DIN CCERTCO (test report 1059-PZA-15). These tests can also be transferred to the surrounding wavelengths with the same OD.

Dimension [mm]	Art. Number
200×100	000.P1L03.1001
297×210	000.P1L03.1002
450×300	000.P1L03.1006
600×450	000.P1L03.1007

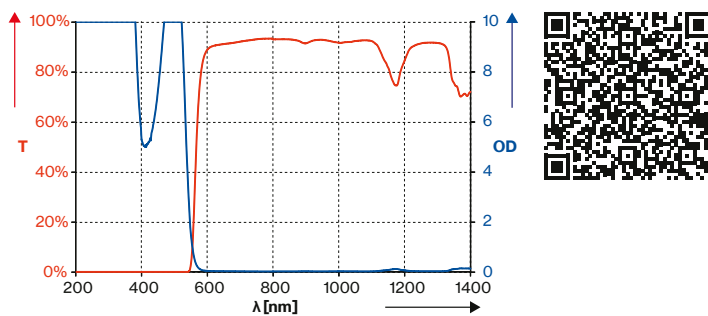
# Plastic Laser Safety Windows

## Window P1N01



- Standard filter for 532 nm Nd:YAG laser
- Max. dimension: 1219 × 915 mm

Transmission-/OD Curve P1N01\*\*



Window	P1N01
Colour	Orange
Certification	OD
VLT (approx. )	38%
Visual Brightness	Sufficient
Colour View	Slightly Limited
Filter Thickness	approx. 3mm

Wavelength [nm]	OD
180 – 315	OD10+
>315 – 370	OD6+
>370 – 383	OD7+
>383 – 391	OD8+
>391 – <445	OD7+
445 – <455	OD6+
455 – <463	OD5+
463 – 524	OD4+
>524 – 532	OD2+
>532 – 535	OD3+
>535 – 538	OD4+
>538 – 541	OD5+
>541 – 545	OD6+
>545 – 550	OD7+
5400 – <10600	OD8+
10600 – 11000	OD7+

Wavelength [nm]	Certified protection levels acc. to DIN 207
180 – 315	D LB6 + R LB3 + M LB6Y
>524 – 532	D LB6 + R LB3 + M LB5Y

For the above mentioned protection levels, the laser exposure tests were carried out according to EN207 and confirmed by the independent Notified Body DIN CCERTCO (test report 1059-PZA-15). These tests can also be transferred to the surrounding wavelengths with the same OD.

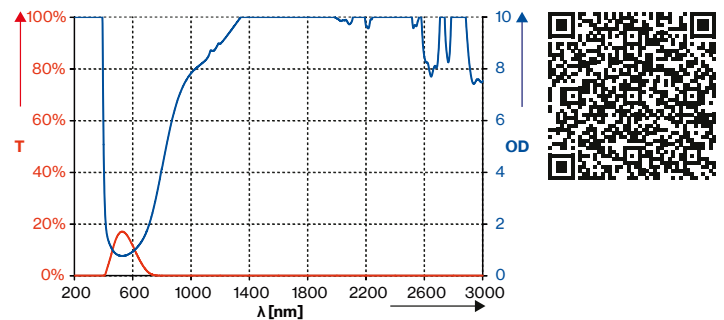
Dimension [mm]	Art. Number
200×100	000.P1N01.1001
297×210	000.P1N01.1002
450×300	000.P1N01.1006
600×450	000.P1N01.1007

## Window P1P10



- Broadband highpower filter
- Anti-scratch coating as standard

Transmission-/OD Curve P1P10\*\*



Window	P1P10
Colour	Blue
Certification	CE
VLT (approx. )	16%
Visual Brightness	Sufficient
Colour View	Good
Filter Thickness	approx. 3 o. 6 mm

Protection according to DIN EN 60825-4:2011					
3mm	830-3000nm	407 kW/m <sup>2</sup>	T3	t <sub>max</sub> =63s	
	5200-14700nm	50,9 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	
6mm	870 – 1100nm	77 kW/m <sup>2</sup>	T2	t <sub>max</sub> =210s	
	4700-25000nm	103 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	

Wavelength [nm]	OD	Filter Thickness 3mm			Filter Thickness 6mm			
		Protection levels			Protection levels			
180-315	10+	D LB10+IR	LB4+M	LB6	D LB10+IR	LB4+M	LB6	
>315-385	8+	D LB6+IRM	LB8		D LB6+IRM	LB8		
>385-400	4+	DIRM	LB4		DIRM	LB4		
635-<720	1+	DIRM	LB1		DIRM	LB1		
720-<770	2+	DIRM	LB2		DIRM	LB2		
770-<800	3+	DIRM	LB3		DIRM	LB3		
800-<840	4+	DIRM	LB4		DIRM	LB4		
840-<880	5+	DIRM	LB5		DIRM	LB5		
880-<960	6+	DIRM	LB6		DIRM	LB6		
960-<1030	7+	D LB6 + IRM	LB7		DIRM	LB7		
1030-1400	8+	D LB6 + IRM	LB8		D LB7 + IRM	LB8		
>1400-3600	4+	D LB3 + I	LB4 + R	LB3Y + M	LB1	D ILB4 + R	LB3Y + M	LB1
>3600-4800	3+	D ILB3 + R	LB3Y + M	LB1		D ILB3 + R	LB3Y + M	LB1
>4800-11500	4+	D ILB4 + R	LB3Y			D ILB4 + R	LB3Y	
635 – 690	1-2	0,01W 1x10E-6J RB1			0,01W 2x10E-6J RB1			

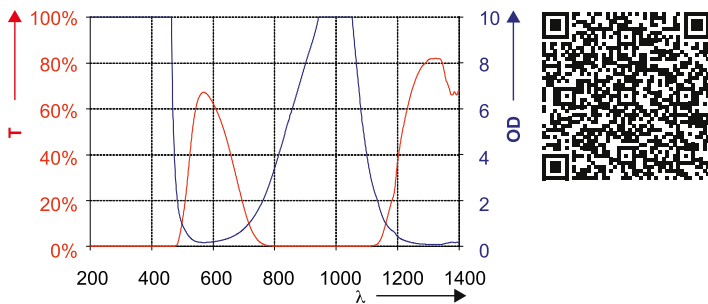
Dimension [mm]	Art. Number [3mm]	Art. Number [6mm]
200×100	000.P1P10.2001	000.P1P10.2601
297×210	000.P1P10.2002	000.P1P10.2602
600×450	000.P1P10.2007	000.P1P10.2607
2000×1000	000.P1P10.2008	000.P1P10.2608

## Window P1P20



- Available with 6 mm thickness
- Max. Dimension: 1850 × 1150 mm
- OD6 at 180-470 nm and 808-1100 nm
- 47 % VLT

Transmission-/OD Curve P1P20\*\*



Window	P1P20
Colour	Gold
Certification	EN 60825-4
VLT (approx.)	52%
Visual Brightness	Very Good
Colour View	Good
Filter Thickness	approx. 6mm*

Protection according to DIN EN 60825-4:2011				∅ 50mm
200-469nm	102 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	
850-1084nm	102 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	
4700-25000nm	103 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s	

Wavelength [nm]	OD
180 – 458	10+
>458 – 462	8+
>462 – 466	6+
800 – <830	3+
830 – <850	4+
850 – <880	5+
880 – <910	6+
910 – <940	7+
940 – <955	8+
955 – <975	9+
975 – 1035	10+
>1035 – 1045	9+
>1045 – 1055	8+
>1055 – 1064	7+
>1064 – 1075	6+
>1075 – 1084	5+
>1084 – 1095	4+
>1095 – 1105	3+
5180 – 14700	10+

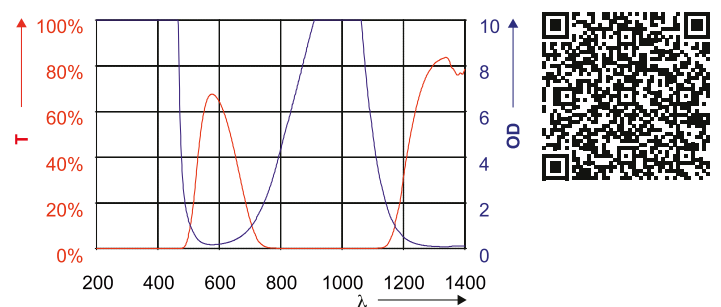
Dimension [mm]	Art. Number
200 x 100	000.P1P20.2601
297 x 210	000.P1P20.2602
450 x 300	000.P1P20.2606
600 x 450	000.P1P20.2607

## Window P1P21



- For high power diodes, disc-, Nd:YAG-, fiber-, CO<sub>2</sub>-laser
- High protection levels
- 50% VLT
- Scratch resistant on both sides

Transmission-/OD Curve P1P20\*\*



Window	P1P21
Colour	Gold
Certification	EN60825-4/EN 12254/EN207
VLT (approx.)	approx. 50%
Visual Brightness	Very Good
Colour View	Good
Filter Thickness	approx. 3mm*

Protection according to DIN EN 60825-4			
200-470nm	40,7 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s
815-100nm	40,7 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s
5230-14250nm	50,9 kW/m <sup>2</sup>	T2	t <sub>max</sub> =105s

Wavelength [nm]	OD	Wavelength [nm]	
180-460	10+	180 – 315	D LB10+IR LB4 + M LB6Y
>460-464	8+	>315-464	D LB6+IR LB8+M LB8Y
>464-466	6+	>464-468	DIRM LB6
780-<800	3+	780-<800	DIRM LB3
800-<815	4+	800-<815	DIRM LB4
815-<835	5+	815-<835	DIRM LB5
835-<860	6+	835->860	DIRM LB6
860-<880	7+	860-<880	D LB6+IRM LB7
880-<905	8+	880-1075	D LB6+IR LB8+M LB8Y
905-<940	9+	>1075-1081	D LB6+IRM LB7
940-1055	10+	>1081-1090	DIRM LB6
>1055-1065	9+	>1090-1100	DIRM LB5
>1065-1075	8+	>1100-1110	DIRM LB4
>1075-1081	7+	4780-5050	DI LB4+R LB3Y+M LB5Y
>1081-1090	6+	>5230-14570	DI LB4+R LB3Y+M LB6Y
>1090-1100	5+		
>1100-1110	4+		
4780-5050	5+		
5230-14570	8+		

Dimension [mm]	Art. Number	Wavelength [nm]	
200 x 100	000.P1P21.2001	180 – 315	D AB10+IR AB4 + M AB6Y
297 x 210	000.P1P21.2602	>315-464	D AB6+I AB8+ R AB7+M AB8Y
450 x 300	000.P1P21.2606	>464-468	DIRM AB6
600 x 450	000.P1P21.2607	780-<800	DIRM AB3
		800-<815	DIRM AB4
		815-<835	DIRM AB5
		835->860	DIRM AB6
		860-<880	DIRM AB7
		880-1050	DR AB7+IB8+M AB8Y
		>1050-1075	D AB6+I AB8+R AB7+M AB8Y
		>1075-1081	D AB6+IRM AB7
		>1081-1090	DIRM AB6
		>1090-1100	DIRM AB5
		>1100-1110	DIRM AB4
		4780-5050	DI AB4+R AB3Y+M AB5Y
		>5230-14570	DI AB3+R AB3Y+M AB6Y

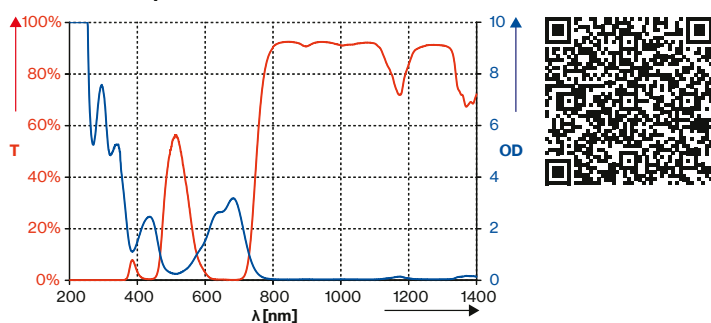
# Plastic Laser Safety Windows

## Window P5B04



- Standard filter for red lasers
- Max. dimension: 1219 × 915 mm

Transmission-/OD Curve P5B04\*\*



Window	P5B04
Colour	Green
Certification	OD
VLT (approx. )	25%
Visual Brightness	Limited
Colour View	Slightly Limited
Filter Thickness	approx. 3mm

Wavelength	[nm]	OD
	580–600	1-2
	>600–620	1+
	>620–633	2-3
	>633–<670	2+
	670–690	2-3
	>690–710	2+
	>710–725	1+

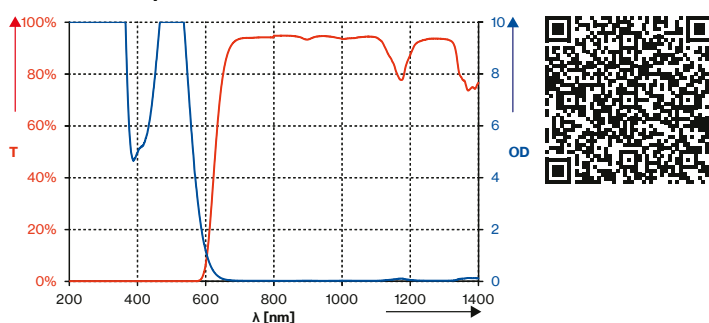
Dimension	[mm]	Art. Number
	200×100	000.P5B04.1001
	297×210	000.P5B04.1002
	450×300	000.P5B04.1006
	600×450	000.P5B04.1007

## Window P5E04



- Standard filter for UV, blue and green lasers
- Max. dimension: 1219 × 915 mm

Transmission-/OD Curve P5E04\*\*



Window	P5E04
Colour	Dark Red
Certification	OD
VLT (approx. )	6%
Visual Brightness	Limited
Colour View	Limited
Filter Thickness	approx. 3mm

Wavelength	[nm]	OD
	180–360	10+
	>360–365	8+
	>365–370	6+
	>370–380	5+
	>380–<401	4+
	401–<440	5+
	440–<450	6+
	450–<455	7+
	455–<460	8+
	460–<470	9+
	470–532	10+
	>532–540	9+
	>540–545	8+
	>545–550	7+
	>550–558	6+
	>558–566	5+
	>566–574	4+
	>574–580	3+
	>580–589	2+
	>589–600	1+
	5400–<10600	5+
	10600–11000	6+
	>11000–11500	5+

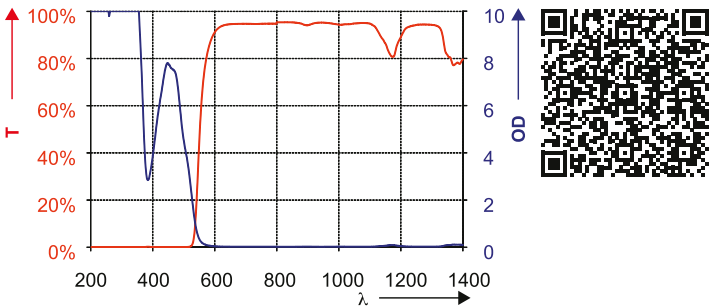
Dimension	[mm]	Art. Number
	200×100	000.P5E04.1001
	297×210	000.P5E04.1002
	450×300	000.P5E04.1006
	600×450	000.P5E04.1007

## Window P5E05



- For high power laser in the UV and blue wavelength range
- For low power laser in the green wavelength range
- 45% daylight transmission (VLT)
- Material based on PMMA

### Transmission-/OD Curve P5E04\*\*



<b>Window</b>	<b>P5E05</b>
	Full Protection
<b>Colour</b>	Orange
<b>Certification</b>	OD
<b>VLT (approx. )</b>	approx. 45%
<b>Visual Brightness</b>	Very Good
<b>Colour View</b>	Good
<b>Filter Thickness</b>	approx. 3mm

Wavelength	[nm]	OD
	180-353	10+
	>353-362	8+
	>362-369	6+
	>369-<413	3+
	413-<435	6+
	435-477	8+
	>477-492	6+
	>492-515	4+
	>515-522	3+
	>522-528	2+
	>528-538	1+
	5400-<10600	5+
	10600-11000	6+
	>11000-11500	5+

Dimension	[mm]	Art. Number
	200×100	000.P5E05:1001
	297×210	000.P5E05:1002
	450×300	000.P5E05:1006
	600×450	000.P5E05:1007

# Kit for active laser safety windows

## Active cabin window kit A0EP1P01

Especially long-lasting laser processes, such as additive manufacturing of complex metal parts with the help of powerful lasers, result in special requirements for laser protection. To protect observers at any time and allow an unrestricted view of the laser process Laservision translated the double-layer protection method of the LaserSpy into the patented active laser safety window.



Successfully tested with a 16-kW disc laser



- Customer-specific dimensions
- Max. size 590 × 895 mm
- Flexible positioning of the LaserSpy
- Certified category T1 for automated operation without supervision
- Suitable for 24h operation
- Wavelength spectrum 820–1100 nm
- CE certified in accordance with the EC Machinery Directive
- Laser safety window tested up to laser power of 16 kW
- Easy integration into safety circuits
- Monitoring of the wall or door element in which the kit is installed



OEM kit	Art. number
Customer-specific sizes	A0E.P1P01...
Effective window size	Art. number
590 × 895 mm	A0E.P1P01:1006
297 × 420 mm	A0E.P1P01:1007
590 × 445 mm	A0E.P1P01:1008

### Level of protection

Wavelength	OD
820 – <850 nm	8+
850 – <940 nm	10+
940 – 1065 nm	10+
>1065 – 1080 nm	8+
>1080 – 1100 nm	6+

### Limit values

Time limits	Trigger time max. 40 ms Protection duration min. 100 ms
PEL $d_{min}$	$d_{min} = 400 \mu\text{m}$
$A_{min}$	$A_{min} = 126 \times 10^{-9} \text{m}^2$
$E_{max}$	$E_{max} = 31,8 \times 10^9 \text{W/m}^2$
Laser type	NIR Laser
Wavelength	820–1100 nm
Operating mode	cw ... 300 $\mu\text{s}$ pulse length



## Frames for laser safety windows

Laservision window frames for the standard window dimensions  $200 \times 100 \text{ mm}^2$  and  $297 \times 210 \text{ mm}^2$  enable the rapid, secure installation of both our mineral glass and plastic laser safety windows for use in laser applications such as welding, cutting, drilling, and marking and in additive manufacturing processes in laser enclosures, walls, partitions and doors. They are manufactured from grey, powder-coated sheet steel.

These frames can accommodate windows with a thickness of 3–13 mm. The frames incorporate sponge rubber to protect the windows. This protection also prevents dirt from getting into the frame.



- For standard window dimensions  $200 \times 100 \text{ mm}^2$  and  $297 \times 210 \text{ mm}^2$
- For laser safety windows made from glass or plastic
- For a thickness of 3–13 mm
- Sponge rubber prevents dirt from penetrating
- Easy to change laser safety windows
- For laser applications such as welding, cutting, drilling and marking
- For additive manufacturing processes
- For laser enclosures, partitions and doors



## Window film P5P14

### NIR and IR range

P5P14 laser safety film from laservision is a thin, blue-green plastic film without any additional reflective coating. The laser protection is based on the absorption of laser beams in the film itself. The film provides daylight transmission of approx. 55%.

The laservision P5P14 laser safety film is marked only with OD (optical density) values and is available in a range of sizes to suit requirements. The maximum width is 1.50 m.

It is particularly suitable for covering large areas of glass, but is also an excellent, extremely flexible solution for smaller windows.

Applying the film on both sides of the glass or in two layers doubles the optical density of the laser safety film.

The laservision P5P14 laser safety film is usually laminated by our service provider, but this can also be done by the customer.

- Laser safety film with a high level of transparency
- For applications with diodes, Nd:YAG, Er:YAG, Ho:YAG and CO<sub>2</sub> lasers
- OD1+ to 2+ at 800–3000 nm
- OD2+ at 9000 – 11500 nm
- Additional UV protection
- Very good daylight transmission of 55%
- Very good colour view
- Double OD if applied on both sides of the pane
- Lamination is a service by default with P5P14.1001
- Self-application possible with P5P14.1LFM1



Art. number	Packaging unit
000.P5P14.1001	1 m <sup>2</sup> Lamination is performed by the service provider. This is charged at cost.
000.P5P14.1LFM1	Standard width approx. 1.50 m for self-application calculated based on running metres



# Large-area laser protection



Mobile laser, flexible workspaces, changing experiments and even just conventional service tasks pose a particular challenge when it comes to large-area laser protection.

With this in mind, laservision has developed a wide range of large-area laser protection options using various barrier materials and profile systems, so you are guaranteed to find the perfect solution for every application when needing to shield laser work areas or public areas – whether on a temporary or permanent basis.

The individual products differ in terms of their laser resistance, certification, mechanical properties and flexibility.

One of the solutions that laservision offers is a German Design Award-winning mobile barrier solution (E25 modular barrier system) with various laser safety materials.

There is also a miniature, table-top version (TTP) of the E25 system available, which offers a host of features to make working on an optical table much easier.

The barriers from laservision consist of aluminium cover layers with various barrier materials and are all certified in accordance with EN 60825-4 in the NIR range – a key area for industry.

Both sides of the materials can be used, and the panels are individually adaptable – they can be tailored to specific requirements with drill holes and cut-outs.

**laservision products  
for large-area laser  
protection**

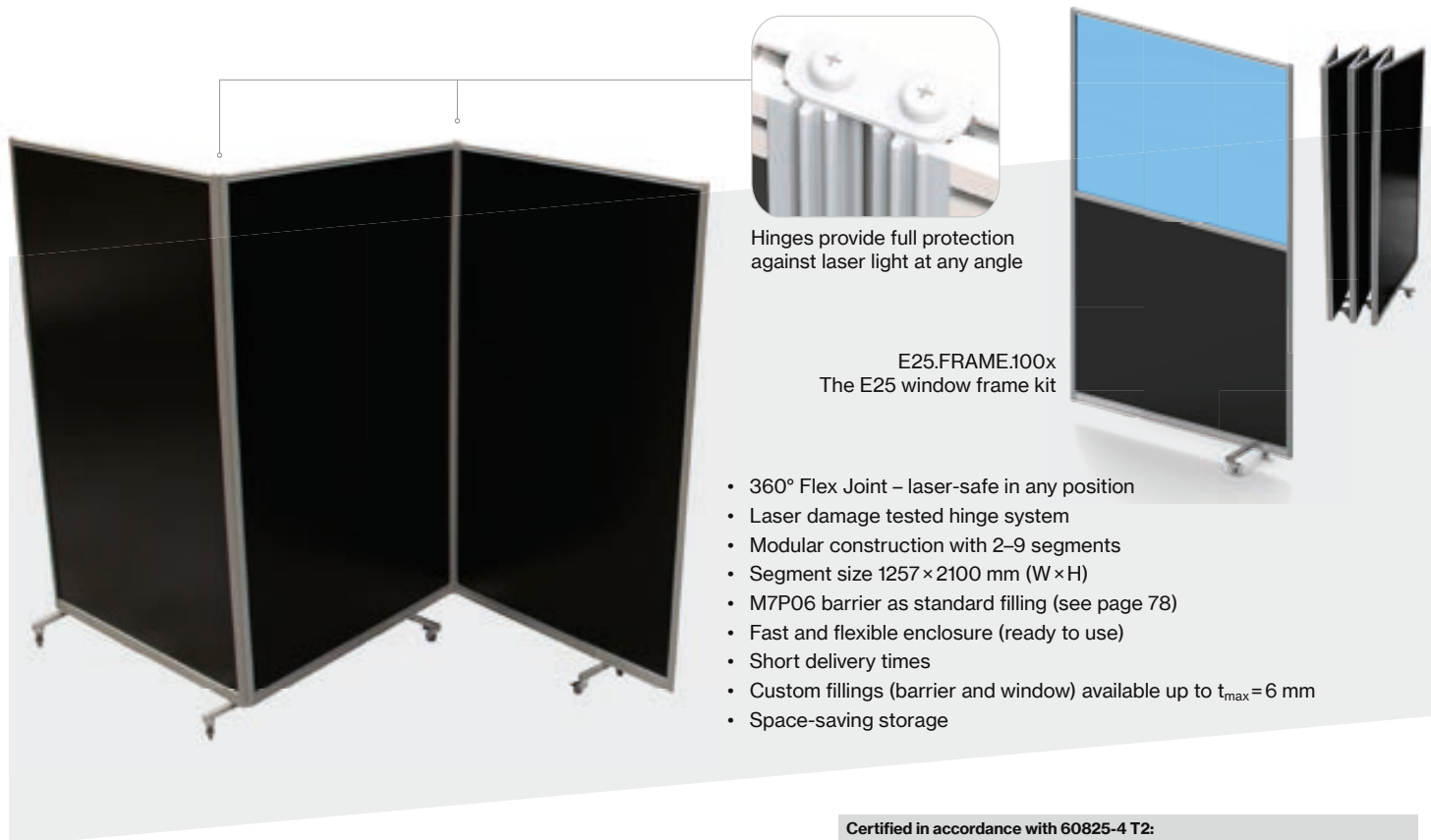
These are available on our  
website:



## E25 E25 Modular Barrier System

The E25 modular, fully assembled laser protective folding wall system from laservision offers a flexible and quick way to shield laser beams during maintenance and service work on powerful laser. The E25 system can also be set up as a room divider in laboratories or laser-safe partitioning around optical tables, for example.

Thanks to the flexible hinge system, the E25 system takes up very little space in storage. It is secured in its end position with a sturdy strap (supplied).



Hinges provide full protection against laser light at any angle

E25.FRAME.100x  
The E25 window frame kit

- 360° Flex Joint – laser-safe in any position
- Laser damage tested hinge system
- Modular construction with 2–9 segments
- Segment size 1257 × 2100 mm (W × H)
- M7P06 barrier as standard filling (see page 78)
- Fast and flexible enclosure (ready to use)
- Short delivery times
- Custom fillings (barrier and window) available up to  $t_{max} = 6$  mm
- Space-saving storage

### Premium barrier material for high levels of protection

Further information is available on page 78.

The standard barrier material (M7P06) features an aluminium sandwich structure with coated aluminium cover plates (black). This material has been tested and certified in accordance with DIN EN 60825-4.

Different filling materials from laservision (e.g. plastic windows) can optionally be installed. The plastic windows listed in the table can be found on page 67.

#### Certified in accordance with 60825-4 T2:

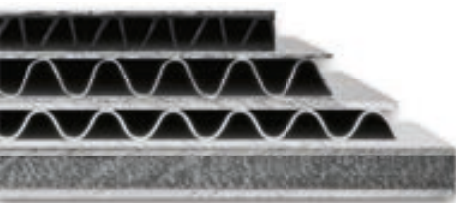
780-1400 nm:  $I_{avg} = 480 \text{ kW/m}^2 / I_{0,max} = 960 \text{ kW/m}^2$

9000-11000 nm:  $I_{avg} = 615 \text{ kW/m}^2 / I_{0,max} = 1.23 \text{ MW/m}^2$

Description	Dimensions	Art. number
Start/end module	1257 × 2100 mm (W × H)	E25.M7P06.1001
Inside module	1257 × 2100 mm (W × H)	E25.M7P06.1002
Window frame kit	On request	E25.FRAME.1001
Available windows	On request	e.g. P1D01, P1L03, P1N01, P1P10, P1P20, P1P21
Transport packaging	Based on cost	E25.VPACK.1000

#### Optional accessories

Description	Art. number
Accessory set for linear connection of 2-piece E25 folding wall systems	E25.JOINT.1001
Accessory set for attaching an interlock switch to two ends of E25 folding wall systems	E25.ILOCK.1001
Accessory set for creating a door from two ends of E25 folding wall systems	E25.DOORS.1001
Accessory for different window solutions	E25.FRAME.100x (on request)



# Laser protection for optical tables

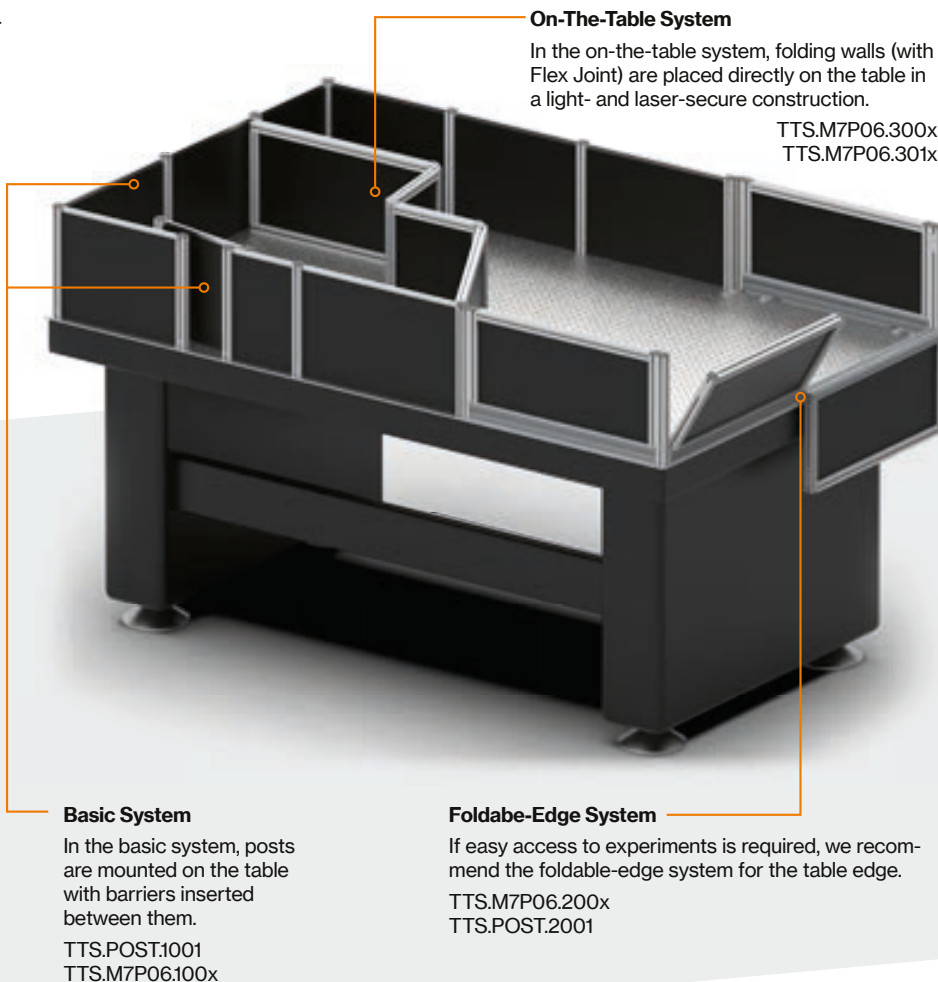
## TTS – Table-Top System

### Laser protection for optical tables

#### Available as a basic system, on-the-table system or foldable-edge system

Each of these variants offers a safe laser protection solution with a flexible design for all conventional OT sizes. The well known barrier M7P06 for the NIR range is available in various standard sizes. It has been tested and certified in accordance with DIN EN 60825-4. Other sizes and materials are available on request. The laser protection systems for optical tables (TTS) are based on the E25 folding wall system from laservision.

- Especially suitable for IR lasers
- Maximum flexibility of the structure on optical tables (OT)
- Systems can be combined partly with each other.
- Laser safety barrier (M7P06) available in various standard sizes
- Tested and certified in accordance with DIN EN 60825-4
- Customer-specific sizes available on request
- Also available with materials such as X1P02 and X1P03 on request



#### On-The-Table System

In the on-the-table system, folding walls (with Flex Joint) are placed directly on the table in a light- and laser-secure construction.

TTS.M7P06.300x  
TTS.M7P06.301x

#### Basic System

In the basic system, posts are mounted on the table with barriers inserted between them.

TTS.POST.1001  
TTS.M7P06.100x

#### Foldable-Edge System

If easy access to experiments is required, we recommend the foldable-edge system for the table edge.

TTS.M7P06.200x  
TTS.POST.2001

## The Basic System

### Specially developed for optical tables (OT) based on the E25 system

- Maximum flexibility of the structure
- Systems can also be combined
- Laser safety plates (M7P06) available in various standard sizes
- Tested and certified in accordance with DIN EN 60825-4
- Customer-specific sizes available on request
- Especially suitable for IR lasers
- Can be mounted with screw posts on tables with 25-mm grid and M6 holes (TTS.POST.1001)
- Magnetic columns can be freely placed on magnetic tables (TTS.POST.1002)
- M7P06 barrier in standard sizes with edge protection available from stock

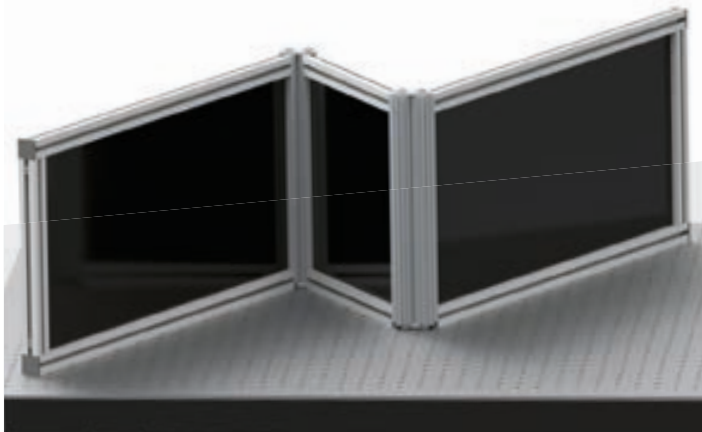


#### Optional accessories

Basic system	Art. number
Barrier 306 × 208 mm (H × W) – (8x holes)	TTS.M7P06.1001
Barrier 306 × 308mm (H × W) – (12x holes)	TTS.M7P06.1002
Barrier 306 × 383mm (H × W) – (15x holes)	TTS.M7P06.1003
Barrier 306 × 408mm (H × W) – (16x holes)	TTS.M7P06.1004
Barrier 306 × 458mm (H × W) – (18x holes)	TTS.M7P06.1005
Barrier 306 × 508mm (H × W) – (20x holes)	TTS.M7P06.1006

## On-The-Table System

A foldable system assembled on the table



The On-The-Table System with Flex Joint for laser-secure shielding of structures on the table

- Maximum flexibility of the structure
- Easy to set up on the OT in accordance with individual requirements
- Greater stability thanks to magnets (magnetic table surface required)
- Tested and certified in accordance with DIN EN 60825-4
- Partly combinable with the Basic System and Foldable-Edge System
- Space-saving storage when not in use

Start/end module	Art. number
Barrier 306 × 300mm (H × W)	<b>TTS.M7P06.3001</b>
Barrier 306 × 600mm (H × W)	<b>TTS.M7P06.3002</b>
Barrier 306 × 900mm (H × W)	<b>TTS.M7P06.3003</b>

Extension module	Art. number
Barrier 306 × 300mm (H × W)	<b>TTS.M7P06.3011</b>
Barrier 306 × 600mm (H × W)	<b>TTS.M7P06.3012</b>
Barrier 306 × 900mm (H × W)	<b>TTS.M7P06.3013</b>

## Foldable-Edge System

Enables easy access to experiments

- Foldable for easy access to structures on the OT
- Modules available in 2 standard sizes
- Magnets used for locking to the system columns and between the modules
- Construction prevents the modules from falling on the table
- Tested and certified in accordance with DIN EN 60825-4
- Partly combinable with the Basic System and On-The-Table System

Foldable-edge system	Art. number
Barrier 306 × 600mm (H × W)	<b>TTS.M7P06.2001</b>
Barrier 306 × 1200mm (H × W)	<b>TTS.M7P06.2002</b>



The Foldable-Edge System with folding side module



# Filling materials for laser safety barriers



The laser safety barriers from laservision are all approx. 6 mm thick, consist of aluminium cover layers with various filling materials and are certified in accordance with EN 60825-4 in the NIR range – a key area for industry. Depending on the construction, there are lightweight plate materials that provide light ( $I_{avg} = 480 \text{ kW/m}^2$ ) to moderate laser protection ( $I_{avg} = 1.5 \text{ MW/m}^2$ ) or slightly heavier plate materials for high-power applications up to  $8.1 \text{ MW/m}^2$  ( $I_{avg}$ ).

- Both sides can be used
- Customer-specific dimensions available – including drill holes and cut-outs e.g. for cables
- Certified in accordance with DIN EN 60825-4 (T2)
- Can be used for cabin construction

## Barrier material M7P06

- Black
- Special aluminium sandwich structure with coated aluminium cover plates



Protection levels in accordance with 60825-4	
780-1400 nm	$I_{avg} = 480 \text{ kW/m}^2 / I_{0,max} = 960 \text{ kW/m}^2$
9000-11000 nm	$I_{avg} = 615 \text{ kW/m}^2 / I_{0,max} = 1.23 \text{ MW/m}^2$

Protection levels in accordance with EN 12254 in certification	

Description	Dimensions (D×W×H)	Art. number
Barrier M7P06	6 × 1219 × 2438 mm	BMOM7P065PM1



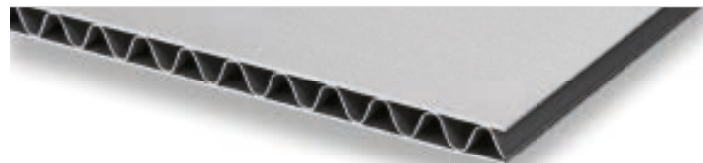
## Barrier material X1P02

- Made entirely from aluminium
- Grey



Protection levels in accordance with 60825-4	
940-1400 nm	$I_{avg} = 542 \text{ kW/m}^2 / I_{0,max} = 1.08 \text{ MW/m}^2$
9000-11000 nm	$I_{avg} = 766 \text{ kW/m}^2 / I_{0,max} = 1.53 \text{ MW/m}^2$

Description	Dimensions (D×W×H)	Art. number
Barrier X1P02	6 × 1500 × 3000 mm	BMOX1P021001



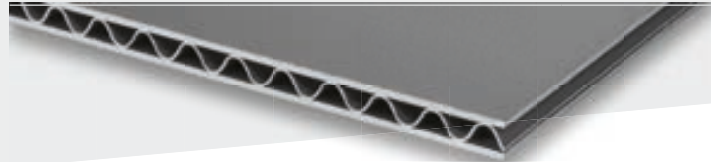
## Barrier material X1P03

- Made entirely from aluminium
- Grey



Protection levels in accordance with 60825-4	
940-1100 nm	$I_{avg} = 1.5 \text{ MW/m}^2 / I_{0,max} = 3.0 \text{ MW/m}^2$
9000-11000 nm	$I_{avg} = 1.08 \text{ MW/m}^2 / I_{0,max} = 2.16 \text{ MW/m}^2$

Description	Dimensions (D×W×H)	Art. number
Barrier X1P03	6 × 1500 × 3000 mm	BMOX1P031001



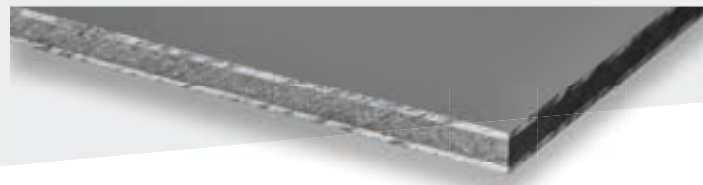
## Barrier material X1P04

- Passive high-power barrier with graphite filling
- Grey



Protection levels in accordance with 60825-4	
940-1100 nm	$I_{avg} = 8.11 \text{ MW/m}^2 / I_{0,max} = 16.22 \text{ MW/m}^2$
9000-11000 nm	$I_{avg} = 1.08 \text{ MW/m}^2 / I_{0,max} = 2.16 \text{ MW/m}^2$

Description	Dimensions (D×W×H)	Art. number
Barrier X1P04	6.2 × 1149 × 2489 mm	BMOX1P041001



# Laser safety curtains, slats and roller blinds



Different applications require different solutions with a wide range of protection levels. laserservice offers laser safety curtains tested/certified in accordance with DIN EN 12254 (shielding of laser working spaces) and/or DIN EN 60825-4 (safety of laser products) in various designs. This means that the flexible and safe shielding of laser working spaces is guaranteed – no matter what the application is.

The modular design of the BC1, BC3 and BC6 curtains with the F1P01 fabric allows large areas to be covered using a combination of smaller standard curtain panels.

The new BC4 laser safety curtain with F1P02 fabric meanwhile enables very large areas to be protected using a single laser safety curtain.

The new roller blind systems (BC2) and vertical slats (BC5) are ideal for shielding windows and viewing panels.

## Information on the applicable standards:

### DIN EN 12254

- Standard for shielding of working spaces
- Limited to 100W power and 30J pulse energy
- Not applicable to machine enclosures
- Protective effect indicated by AB protection levels
- Or wavelength spectrums and laser operating modes (DIRM) indicated
- Laser safety curtains and roll-ups, roller blinds and slats tested and certified
- Certificates valid for 5 years

### DIN EN 60825-4

- Standard for machine enclosures, cabins and working spaces
- CE certification of laser safety materials based on standard DIN EN 60825-4 of the Machinery Directive
- The standard defines the requirements for the safety walls of laser cabins
- Protective exposure limit (PEL) as protective measure
- Testing performed in three test classes (T1, T2, T3)
- No specific test specification – comparable only when considering all parameters

**Laser safety curtains,  
slats and roller blinds**  
These are available on our  
website:



# Light- and High-Power curtain material F1P01

## SHELTER-NG BC1.F1P01

- Certified in accordance with DIN EN 60825-4
- Protection levels tested in accordance with DIN EN 12254
- Laser protection from both sides

Certified in accordance with DIN EN 60825-4

1070nm | 3.85MW/m<sup>2</sup> | T2 | tmax = 200s



## SHELTER-CR BC6.F1P01

- Anti-static ESD sleeve
- Easy cleaning and disinfection

Certified in accordance with DIN EN 207

Wavelength (nm)	OD	Operating mode/tested level of protection
180–315	-	D AB8 + IR AB3 + M AB6Y
>315–1050	-	D AB7 + I AB8 + R AB7Y + M AB8Y
>1050–1400	-	D AB6 + R AB7Y + M AB8Y
>1400–20000	-	DI AB4 + R AB3Y + M AB4



## Laser safety curtain material F1P01

as Light and High-Power versions

The curtain material F1P01 is based on a coated silicate fabric and has been protecting our customers for years. The curtains are certified in accordance with DIN EN 60825-4 or DIN EN 12254.

The laser safety material F1P01 can be used for light weight laser safety curtains (BC3) as well as for High-Power laser safety curtains (BC1). The BC6 variant has an anti-static cover.

Single elements can be connected via velcro. In case of a laser hit only the affected element needs to be replaced.

- Coated silicate fabric
- Protection levels tested in accordance with DIN EN 12254
- Customer-specific dimensions possible
- Modular construction, standard width approx. 900 mm
- Can be connected using velcro/hook-and-loop tape or silicon arrow/groove tape
- Max. dimensions 2700 × 3500 mm (W × H)
- Short delivery times for standard segments
- Customer-specific solutions on request



Description	Art. number
SHELTER-NG available in 8 standard sizes	BC1.F1P01.x
SHELTER-Light available in 8 standard sizes	BC3.F1P01.x
SHELTER-CR available in 8 standard sizes	BC6.F1P01.x

## SHELTER-Light BC3.F1P01

- Certified in accordance with DIN EN 12254
- Also certified in the light version for 180–11000 nm incl. M protection levels
- Laser preferential direction
- Lightweight design, e.g. for doors



Wavelength (nm)	OD	Operating mode/tested level of protection
180–315	5+	D AB5 + IR AB3 + M AB5Y
>315–1050	5+	DIRM AB5
>1050–1400	5+	DIRM AB5
>1400–20000	5+	DI AB3 + R AB3Y + M AB4



# Laser safety Roll-Up and accessories for constructing laser safety curtains



## Roll-Up BC3.F1P01.x based on BC3 (SHELTER-Light)



- Free-standing laser safety curtain
- Quick and easy assembly, easy to transport
- Join multiple modules using velcro/hook-and-loop tape
- Roll-Up set consisting of 3× roll-ups and 2× connectors incl. bag is the ideal service companion

BC3 Roll-Up variants	Dimensions	Art. number
Roll-Up, stand-alone	900×2000 mm (W×H)	BC3.F1P01.1RU1
Roll-Up connector	450×2000 mm (W×H)	BC3.F1P01.1274
Roll-Up set, consisting of 3× Roll-Ups and 2× connectors incl. bag		VBP999307

## Standard frames and rail systems

093 – 097 & 110

- Easy setup
- 4 heavy-duty swivel castors
- 6 different configurations
- Swivel arms in 2 different lengths (700 mm and 1100 mm)

Description	Art. number
Basic frame 2100 × 2100 mm + 2 swivel arms (1100 mm width)	093
Basic frame 2100 × 2100 mm + 1 swivel arm (1100 mm width)	094
Basic frame 2100 × 2100 mm + 1 swivel arm (700 mm width)	095
Basic frame 2100 × 2100 mm + 2 swivel arms (700 mm width)	096
Basic frame 2100 × 2100 mm without swivel arms	097
Basic frame 2100 × 2100 mm + 1 swivel arm (1100 mm and 700 mm)	110



## Customer-specific rail systems

- Based on E40 aluminium profile series
- Different sliders and rollers depending on application
- For ceiling, wall or floor installation



# Medium-power curtain material F1P02

## Laser safety curtain material F1P02 as medium-power version

The new medium-power curtain material F1P02 is based on a silicon/fibreglass fabric and offers levels of protection tested in accordance with DIN EN 12254. This material can be used to make classic laser safety curtains (BC4), as well as laser safety roller blinds (BC2) and vertical blinds (BC5).

- Wipeable and disinfectable silicon/fibreglass fabric
- Protection levels tested in accordance with DIN EN 12254
- Customer-specific dimensions possible
- Laser protection from both sides

## Vertical blinds BC5.F1P02

- Straightforward management of laser protection and daylight regulation
- Professional, clean appearance for laboratories, medical centres and showrooms
- Standard height up to 2.5 m

### Protection levels tested in accordance with DIN EN 12254

Wavelength (nm)	Operating mode/levels of protection
180–315	D AB9 + I AB4 + M AB3
>315–1050	D AB6 + IM AB8 + R AB7
>1050–1400	D AB5 + IM AB8 + R AB7
>1400–10600	D AB3 + I AB4 + R AB3



## Roller blind BC2.F1P02

- Restricted side guidance against derailing
- The rough side is the visible side
- Standard dimensions up to 2.5 × 2.5 m
- Motorised
- Top mounting (recommended)
- Sub-mounting on customer request



## SHELTER-MP BC4.F1P02

- Standard height up to 4 m
- One piece large laser safety curtains possible
- Fastened via eyelets (16 mm)



Description	Art. number
Laser safety vertical blinds F1P02 – available in 8 standard sizes	<b>BC5.F1P02.10X</b>
Laser safety roller blinds F1P02 – available in 8 standard sizes	<b>BC2.F1P02.10X</b>
Laser safety curtains F1P02 – available in 6 standard sizes	<b>BC4.F1P02.10X</b>

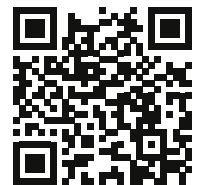


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- The latest news from laservision
- Discussions on laser protection
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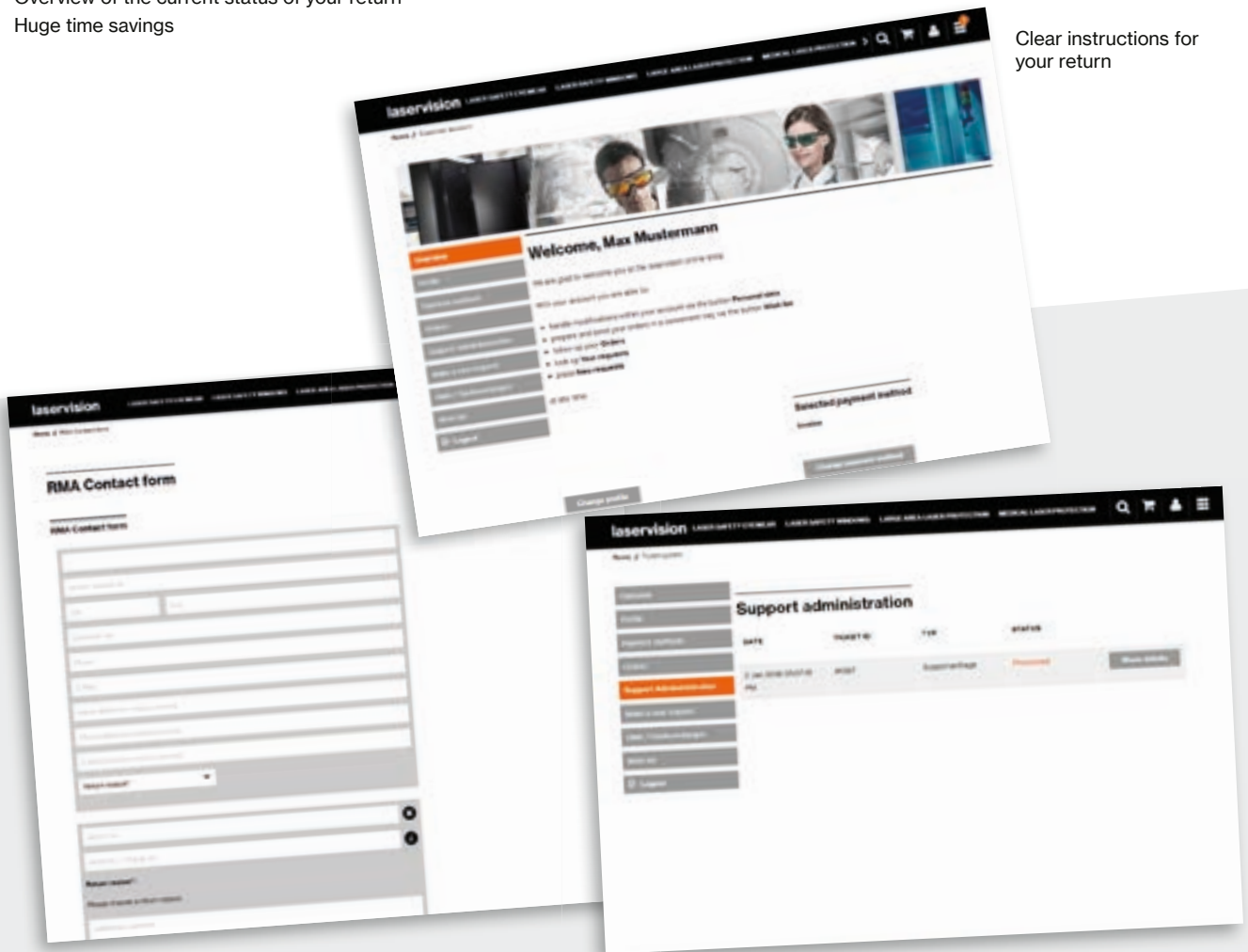
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RMA request form includes all the data we need to process your request quickly without coming back to you for clarification

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Already registered  
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Company \_\_\_\_\_

Contact person \_\_\_\_\_

Street address \_\_\_\_\_

Postcode + town/city \_\_\_\_\_

Telephone \_\_\_\_\_

Fax \_\_\_\_\_

Email \_\_\_\_\_

Please fax back to:  
**+49 911 9736-8199**  
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Laser manufacturer:

Laser model:

We will collect, store and process your data exclusively for the purpose of processing your request. For further information, please see our data protection statement.

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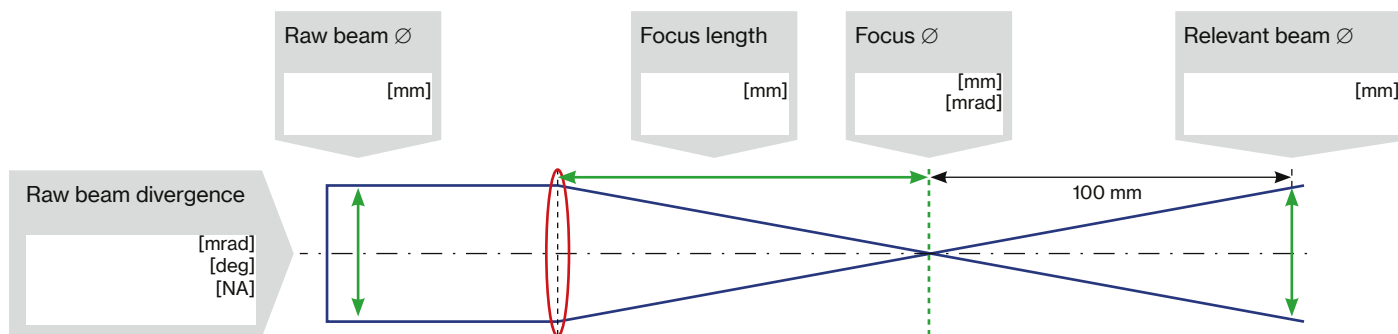
Full protection in accordance with DIN EN 207

I would like laser-specific spectacles

Alignment protection in accordance with DIN EN 208  
 (only available for visible lasers at 400 – 700 nm)

I would like combined spectacles for all lasers

My laser specifications:	Laser 1		Laser 2 (if applicable)		Laser 3 (if applicable)		Unit	
Laser wavelength							nm	
Max. average power with pulse repetition rate							W	Hz
Smallest accessible beam diameter							mm	
Smallest beam divergence or M <sup>2</sup>							mrad (half angle)	
Max. single pulse energy with pulse repetition rate							J	Hz
Max. pulse repetition rate with pulse energy							Hz	J
Shortest/longest pulse length							s	



Date \_\_\_\_\_

Signature \_\_\_\_\_

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