

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×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:



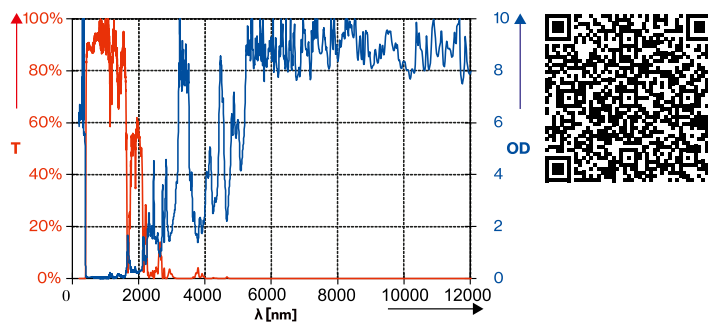
Window P1D01



- CO₂ filter for medium power
- Excellent colour recognition
- CE / EN 60825-4
- Max. dimension: 3000 × 2000 mm



Transmission-/OD Curve P1D01**



Window	P1D01
Colour	Full Protection
Certification	Colourless
CE	CE
VLT (approx.)	90%
Visual Brightness	Excellent
Colour View	Unrestricted
Filter Thickness	approx. 6mm

Protection according to DIN EN 60825-4:2011				
6mm	4700–25000nm	103 kW/m ²	T2	T _{max} =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

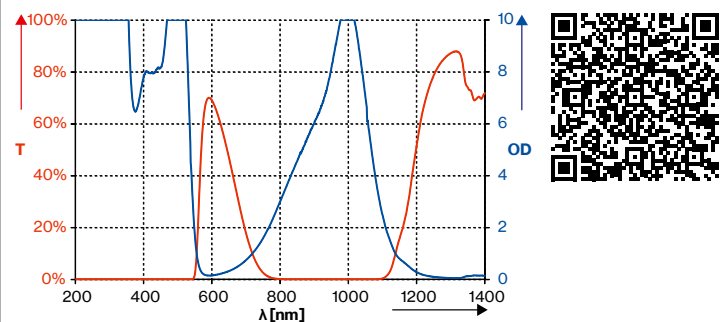
Window P1L03



- 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**



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

Wavelength [nm]	OD
180 - 350	OD10+
>350 - <410	OD6+
410 - <460	OD7+
>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+

Wavelength [nm]	Certified protection levels acc. to DIN 207
180 - 350	D LB6 + R LB3 + M LB6Y
>530 - 532	D LB6 + R LB3 + M LB5Y
>1050 - 1068	DIR LB5

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

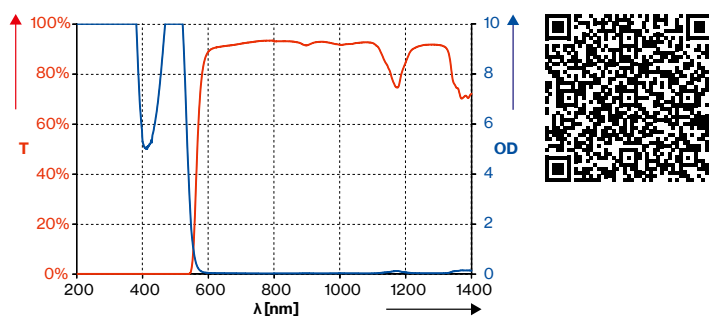
Plastic Laser Safety Windows

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.

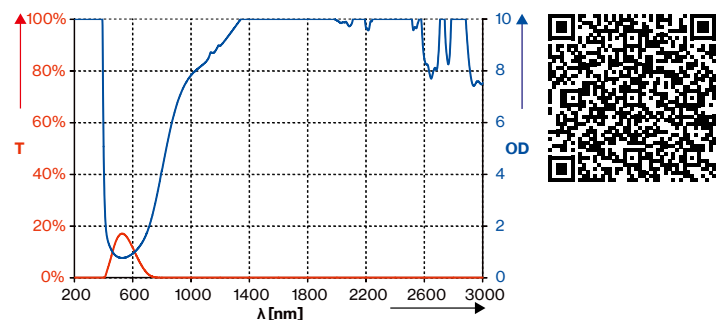
Dimension [mm]	Art. Number
200×100	000.P1N01.1001
297×210	000.P1N01.1002
450×300	000.P1N01.1006
600×450	000.P1N01.1007

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	40,7 kW/m²	T3	t _{max} =63s	
	5200-14700nm	50,9 kW/m²	T2	t _{max} =105s	
6mm	870 – 1100nm	77 kW/m²	T2	t _{max} =210s	
	4700-25000nm	103 kW/m²	T2	t _{max} =105s	

		Filter Thickness 3mm			Filter Thickness 6mm		
Wavelength [nm]	OD	Protection levels			Protection levels		
180-315	10+	D LB10+IRM	LB4+M	LB6	D LB10+IRM	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	D LB4 + 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	

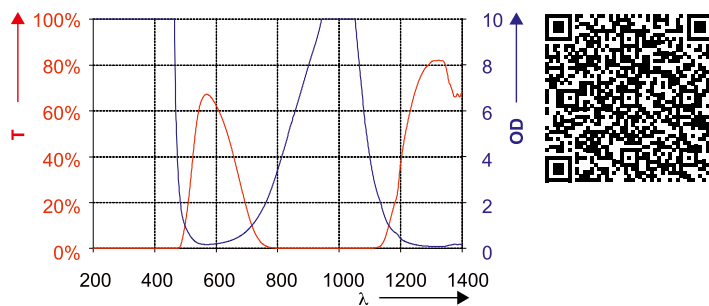
Dimension [mm]	Art. Number [3mm]	Art. Number [6mm]
200×100	000.P1P10.2001	000.P1P10.2601
297×210	000.P1P10.2002	000.P1P10.2602
600×450	000.P1P10.2007	000.P1P10.2607
2000×1000	000.P1P10.2008	000.P1P10.2608

Window P1P20



- For high power diode-, disc-, ND:YAG-, fibre- and CO₂-laser
- D LB7 at 450nm and 1064nm
- Max. dimension: 1840×1150mm
- Visible light transmission appr. 52%

Transmission-/OD Curve P1P20**



Window	P1P20
Colour	Full Protection
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			
200-469nm	102 kW/m ²	T2	t _{max} =105s
850-1084nm	102 kW/m ²	T2	t _{max} =105s
4700-25000nm	103 kW/m ²	T2	t _{max} =105s

Wavelength [nm]	OD	Wavelength [nm]	
180 – 458	10+	180–315	D LB10+IR LB4+M LB6Y
>458 – 462	8+	>315–462	D LB7+IR LB8+M LB8Y
>462 – 466	6+	>462–466	DIRM LB6
800 – <830	3+	800–<830	DIRM LB3
830 – <850	4+	830–<850	DIRM LB4
850 – <880	5+	850–<880	DIRM LB5
880 – <910	6+	880–<910	DIRM LB6
910 – <940	7+	910–<940	DIRM LB7
940 – <955	8+	940–<955	D LB7+IR LB8+M LB8Y
955 – <975	9+	>1055–1064	DIRM LB7
975 – 1035	10+	>1064–1075	DIRM LB6
>1035 – 1045	9+	>1075–1084	DIRM LB5
>1045 – 1055	8+	>1084–1095	DIRM LB4
>1055 – 1064	7+	>1095–1105	DIRM LB3
>1064 – 1075	6+	5180–14700	DI LB5+R LB3Y
>1075 – 1084	5+		
>1084 – 1095	4+		
>1095 – 1105	3+		
5180 – 14700	10+		

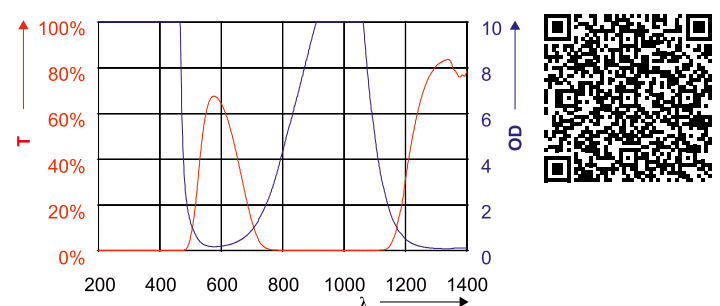
Dimension [mm]	Art. Number
200 x 100	000.P1P20.2601
297 x 210	000.P1P20.2602
450 x 300	000.P1P20.2606
600 x 450	000.P1P20.2607

Window P1P21



- For high power diodes, disc-, Nd:YAG-, fiber-, CO₂-laser
- High protection levels
- 50% VLT
- Scratch resistant on both sides

Transmission-/OD Curve P1P21**



Window	P1P21
Colour	Full Protection
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 ²	T2	t _{max} =105s
815-100nm	40,7 kW/m ²	T2	t _{max} =105s
5230-14250nm	50,9 kW/m ²	T2	t _{max} =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+	>464–466	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–<905	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+		

Wavelength [nm]	
180 – 315	D AB10+IR AB4 + M AB6Y
>315–464	D AB6+I AB8+ R AB7+M AB8Y
>464–468	DIRM AB6
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

Dimension [mm]	Art. Number
200 x 100	000.P1P21.2001
297 x 210	000.P1P21.2602
450 x 300	000.P1P21.2606
600 x 450	000.P1P21.2607

Plastic

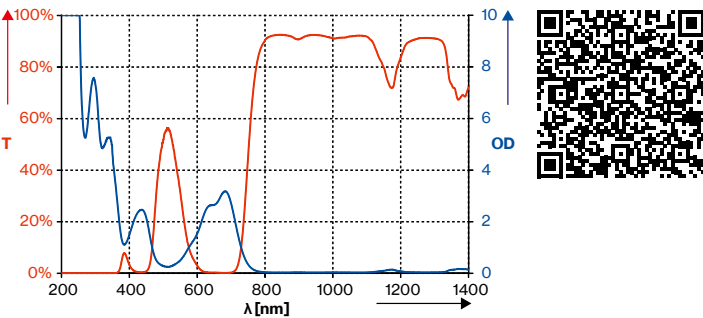
Laser Safety Windows

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+

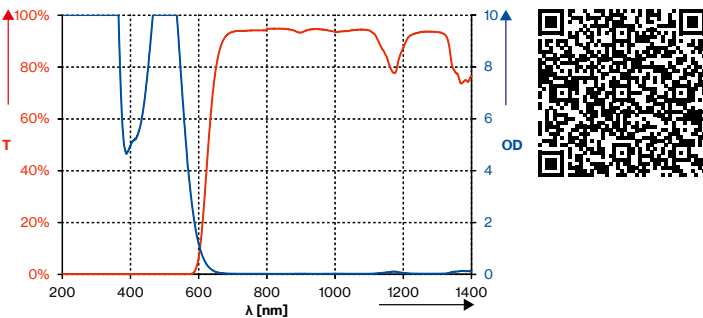
Dimension	[mm]	Art. Number
	200×100	000.P5B04.1001
	297×210	000.P5B04.1002
	450×300	000.P5B04.1006
	600×450	000.P5B04.1007

Window P5E04



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

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+

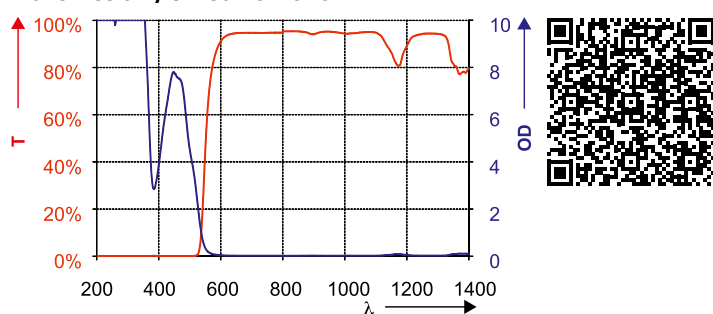
Dimension	[mm]	Art. Number
	200×100	000.P5E04.1001
	297×210	000.P5E04.1002
	450×300	000.P5E04.1006
	600×450	000.P5E04.1007

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**



Window	P5E05
	Full Protection
Colour	Orange
Certification	OD
VLT (approx.)	approx. 45 %
Visual Brightness	Very Good
Colour View	Good
Filter Thickness	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

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 µm
A _{min}	A _{min} = 126 × 10 ⁻⁹ W/m ²
E _{max}	E _{max} = 31,8 × 10 ⁹ W/m ²
Laser type	NIR Laser
Wavelength	820 – 1100 nm
Operating mode	cw ... 300 µs 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%.

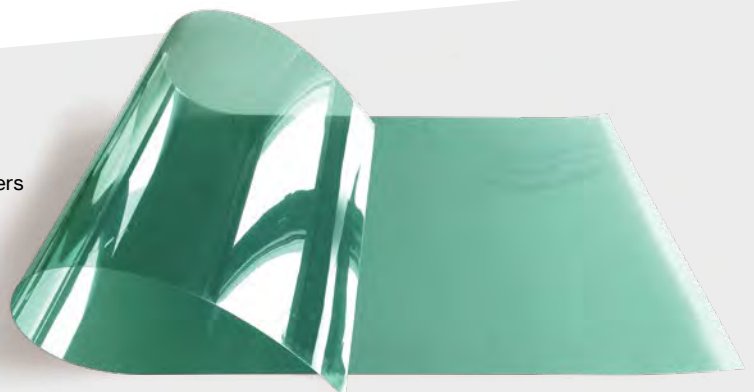
The laservision P5P14 laser safety film is marked only with OD (optical density) values and is available in a range of sizes to suit requirements. The maximum width is 1.50 m.

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 CO₂ 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 ² 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

