

LASER SAFETY EYEWEAR

Photonic Solutions supplies EN207:2010 certified laser safety eyewear for medical, military, aviation, scientific and industrial applications. They are all lightweight, comfortable and are therefore easy to wear – an important consideration for users who may spend long hours wearing them. The eyewear features non-reflective polycarbonate filters which attenuate by absorbing the laser radiation and all items are fully approved with CE certification.



LaserShields

Laser Safety

Under EN 60825-1 classification scheme, lasers are classified into seven hazard classes depending on the accessible emission limits. The scheme is a measure of the laser's ability to produce injuries to personnel. The classes are as follows:

Class 1: the radiation is not dangerous and no protection equipment needed

Class 1M: the radiation is not dangerous when used without optical instruments but may become dangerous when used in combination with optical instruments - no protective equipment required if used without optical instruments

Class 2: The radiation emitted is not dangerous due to aversion responses including the blink reflex – no protective equipment needed

Class 2M: The radiation emitted is not dangerous due to aversion responses including the blink reflex but may become dangerous when used with optical instruments - no protective equipment required if used without optical instruments

Class 3R: The radiation from these lasers exceeds the maximum permissible exposure values so is dangerous to the eyes and safety glasses are recommended

Class 3B: Direct laser view is dangerous so safety glasses are mandatory

Class 4: Both direct and diffuse radiation is dangerous so personal safety equipment is necessary

Understanding Laser Filter Specifications.

In EN207:2010, lasers are divided into 4 regimes, depending on whether they are continuous wave (cw) or pulsed:-

Designation	Laser Type	Pulse width
D	Continuous wave (CW) laser	>250ms
I	Long pulse length laser	1us < I < 250ms
R	Q-switched pulsed laser	1ns < R < 1us
M	Mode locked (ultrafast) pulsed laser	< 1ns, eg picosecond, femtosecond

In accordance with EN207:2010, after testing, the eyewear is clearly marked to specify the minimum level of protection afforded by the filter and frame.

For example on a filter you may see: -

180-315 D LB7 + R LB4 so what does it mean?

180-315: identifies the minimum and maximum wavelength range in nm

D LB7: identifies the laser type, in this case D, which is CW, and LB7 indicates the level of protection across the specified wavelength range with a minimum OD of 7.*

R LB4: identifies the laser type in this case R which is Q-switched pulsed, and LB4 indicates the level of protection across the specified wavelength range with a minimum OD of 4.*

* OD (Optical Density) is not the whole story. The eyewear has to be able to attenuate the beam to provide protection and also withstand a given power or energy density. EN207:2010 therefore takes into account the power or energy density of the incident beam that the filter (and frame) can withstand, ie the damage threshold. Both should be able to withstand a direct hit of laser radiation of specified power/energy and duration – and should retain their blocking properties for 5 seconds for a CW laser or 50 pulses for pulsed lasers.

The damage threshold consideration takes precedence in determining the LB rating, eg a filter demonstrating an OD of 6 but only passing the damage threshold test equivalent for a filter with OD2, would be labelled LB2. By way of a real example, take the EC2 filter which has an OD at 10600nm of greater than 7, but under EN207:2010 it has an LB rating at 10600nm of LB3. With a given LB number, the OD at that wavelength will always be greater than the LB number, ie with an LB5 rating the OD will be at least 5, etc.

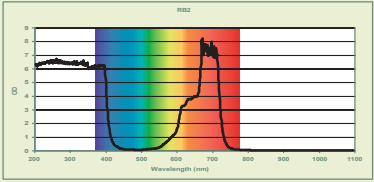
This is the main difference between the USA (ANSI) standard, which only takes OD into account when specifying laser protection, and the European standard which take into account the OD and the damage threshold of the filter and the frame.

Argon/ Doubled Nd:YAG Filter Specification			
ARG	OD 7+ @ 190-532nm Colour Orange	D LB7 + IR LB4 @ 180-315nm DIRM LB6 @ >315-532nm	
M rated for ultrafast lasers	% VLT 48% Material Polycarbonate		
Excimer/CO ₂ Filter Specification			
EC2	OD 7+ @ 190-398nm OD 7+ @ 9,000-11,000nm Colour Clear	D LB7 + IR LB4 @ 190-315nm DIRM LB5 @ >315-398nm DI LB3 @ 9,000-11,000nm	
M rated for ultrafast lasers	% VLT 93% Material Polycarbonate		
Nd:YAG + Harmonics Filter Specification			
DBY	OD 7+ @ 190-534nm OD 7+ @ 960-1064nm OD 6+ @ 925-1070nm OD 5+ @ 850-925nm Colour Amber	D LB7 + R LB4 @ 180-315nm D LB5 + IRM LB6 @ >315-534nm DIRM LB5 @ 850-925nm D LB5 + IRM LB6 @ >925-980nm D LB6 + IRM LB7 @ >980-1064nm	
M rated for ultrafast lasers	% VLT 35% Material Polycarbonate		

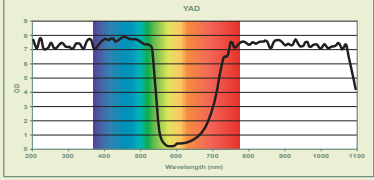
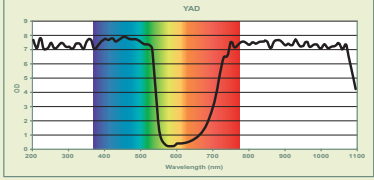
Infra Red Diode Lasers | Filter Specification

IRD	OD 6+ @ 180-450nm	D LB6 @ 180-315nm	
	OD 3+ @ 820-1720nm	DR LB4 @ >315-400nm	
M rated for ultrafast lasers	OD 4+ @ 870-1600nm	DIR LB2 @ >770-820nm	
	OD 5+ @ 940-1070nm	DIR LB3 @ 820-865nm	
	Colour Green	DIR LB4 @ 865-940nm	
	% VLT 19%	DIRM LB5 @ >940-1064nm	
	Material Polycarbonate	DIRM LB4 @ 1064-1400nm	
		DI LB2 @ >1400-1850nm	

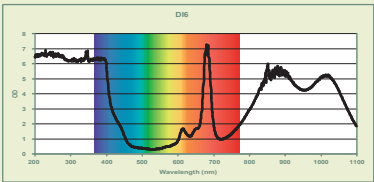
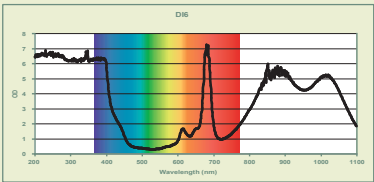
Ruby/HeNe | Filter Specification

RB2	OD 6+ @ 190-400nm	D LB6 @ 180-315nm	
	OD 3+ @ 615-720nm	R LB4 @ 180-400nm	
	OD 4+ @ 651-670nm	D LB4 @ >315-400nm	
	OD 5+ @ 671-715nm	DIR LB3 @ >615-660nm	
	OD 6+ @ 680-710nm	DIR LB4 @ 660-665nm	
	OD 7+ @ 690-700nm	D LB4 + IR LB5 @ >665-715nm	
	Colour Teal	IR LB7 @ 694nm	
	% VLT 35%		
	Material Polycarbonate		

Ti:Sapphire/Nd:YAG + Harmonics | Filter Specification

YAD	OD 7+ @ 180-534nm	D LB5 + IRM LB6 @ >315-534nm	
	OD 5+ @ 720-730nm	D LB5 + IRM LB6 @ 730-740nm	
M rated for ultrafast lasers	OD 6+ @ >730-740nm	D LB6 + IRM LB7 @ >740-1070nm	
	OD 7+ @ >740-1070nm		
	Colour Amber		
	% VLT 11%		
	Material Polycarbonate		

Diode | Filter Specification

DI6	OD 5+ @ 190-400nm	DIR LB3 @ 670-690nm	
	OD 3+ @ 670-695nm	DIR LB3 @ 820-1050nm	
	OD 3+ @ 815-1050nm	DIR LB2 @ 665-<670nm	
	OD 2+ >1050-1080nm	DIR LB2 @ >690-698nm	
	Colour Green	DIR LB2 @ 790-<820nm	
	% VLT 35%	DIR LB2 @ >1050-1080nm	
	Material Polycarbonate		

Diode | Filter Specification

DI4	OD 5+ @ 190-400nm	D LB7 + R LB3 @ 180-315nm	
	OD 4+ @ 625-850nm	D LB5 + R LB6 @ >315-400nm	
	OD 5+ @ 662-835nm	DR LB4 @ 625-830nm	
	OD 5+ @ 633nm	DIR LB3 @ >830-850nm	
	Colour Blue	I LB4 @ 625-670nm	
	% VLT 12%	I LB5 @ >670-800nm	
	Material Polycarbonate	I LB4 @ >800-830nm	

Nd:YAG/Ti:Sapphire | Filter Specification

YG2	OD 6+ @ 180-400nm	D LB6 + R LB4 @ 180-315nm	
	OD 5+ @ 720-1090nm	DR LB4 @ >315-400nm	
M rated for ultrafast lasers	OD 7+ @ 750-1064nm	DM LB5 @ 720-725nm	
	Colour Amber	IR LB5 @ 720-750nm	
	% VLT 25%	DM LB6 @ >725-1075nm	
	Material Polycarbonate	IRM LB7 @ >750-1064nm	
		IR LB5 @ >1064-1075nm	

Mineral Glass | Filter Specification

FG1	OD 3+ @ 850-5200nm	DIR LB5 @ 950-1000nm	
	OD 5+ @ 945-2300nm	DIR LB6 @ >1000-1063nm	
	OD 4+ @ 2300-2500nm	D LB6 + IR LB7 @ >1063-1400nm	
	OD 5+ @ 2800-10600nm	DIR LB4 @ >1400-2500nm	
	OD 7+ @ 1010-1500nm	DI LB4 @ 2900-3200nm	
	Colour Clear	DI LB4 @ 10600nm	
	% VLT 75%		
	Mineral Glass	Available in frame styles #37 or #11 only	

NEW

We offer a range of frame styles which can be worn on their own or over prescription glasses. Some of the latest frame styles eg #34 can take prescription inserts.

Style 11.



- Universal style.
- Comfortable over prescription frames or alone.
- Soft touch frame.

Style 33.



- Universal style.
- Comfortable over prescription frames or alone.
- Soft touch frame.

Style 34.



- Sleek stylish fit.
- Removable prescription insert.
- Soft temples.

Style 36.



- Modern universal style (medium).
- Adjustable temples.
- Comfortable over prescription frames or alone.
- Full field of view.

Style 39.



- Modern fitover style (large).
- Soft touch nylon frame.
- Full field of view.

Style 900.



- Universal style (large).
- Comfortable over prescription frames or alone.
- Full field of view.

Patient I-Shield



The Patient I-Shield is fully adjustable, unbreakable and features a bend-to-fit nosepiece offering revolutionary patient laser safety. The brushed stainless steel tight orbital area eye covers provide high level protection from laser radiation and are ideal for procedures close to the patient's eyes.

We hold all of the following listed LaserShields in stock in Edinburgh for immediate delivery. They can be purchased securely, on-line from our web shop at www.photonicshop.co.uk. We will continue to add to this list, so please check our website or contact us directly if you need a filter which is not listed here. Alternative frame styles as shown are available for same price, however delivery time is around 4 weeks from order.

Filter Type	Frame Style	Price £ (excl VAT)	Availability
ARG	39	110	In stock
EC2	900	75	In stock
DBY	39	135	In stock
IRD	39	130	In stock
RB2	39	120	In stock
YAD	36/39	190	In stock
DI6	39	120	In stock
DI4	36	120	In stock
YG2	39	140	In stock
FG1	37/11	210	In stock



Each LaserShield comes in it's own protective case with cleaning accessory and securing strap

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