

STANDARDS EXPLAINED

European Standards for Eye Protection - BS EN166:2002

All manufacturers of safety eye wear are required to have their products independently tested against a European standard. Firstly it is important to remember that both the Frame and Lens are tested, therefore both must include the CE symbol and the manufacturer's logo. The CE marking certifies that a product has met EU consumer safety, health or environmental requirements.

Frame Markings

The frame will usually be marked on the inside of both arms. All safety frames must pass the European BS EN166 standard. This is a higher standard than the US or Asian equivalent and is considered the baseline for safety eye-wear. If BS EN166 is not stamped on the frame then it may be advisable to look elsewhere. Next will be numbers and/or letters which indicate to what degree the frames passed the BS EN166 test within various categories.

Shape or design of the frame

- 3- Protect against liquid droplets and splashes. This is usually only found on goggles where a full seal is made around the eyes.
- 4- Protect against large dust particle over 5 microns in size.
- 5- Protect against dust and fine dust particles smaller than 5 microns.

Strength of the frame

- S- withstand impacts against small objects traveling up to 12 meters per second
- F- withstand impacts against small objects traveling up to 45 meters per second
- B- withstand impacts against small objects traveling up to 120 meters per second
- A- withstand impacts against small objects traveling up to 190 meters per second
- T- withstand impacts at extreme temperatures

A frame can have a combination of these markings.

Lens Markings

Unlike the frame, lenses can meet various safety standards including BS EN166, 169, 170 & 172. For obvious reasons the manufacturers are not required to print every standard on the lens but simply the degree to which they meet the standard. Using the guide below you can determine which standards they meet. Once again the manufacturers seal and the CE mark are mandatory. In addition will be a degree of solar or UV radiation protection, the optical quality and then the mechanical strength.

Optical quality

- 1- Class 1 High optical- regular use. Refractive power of ± 0.06 dioptres.
- 2- Class 2 Medium optical- occasional use. Refractive power of ± 0.12 dioptres.
- 3- Class 3 Low optical- exceptional use. Refractive power of ± 0.25 dioptres.

Property	Details	Frame Marked	Lens Marked	What it means in practice
Optical	Class 1		1	Suitable for continuous use (all Uci eyewear is Class 1)
	Class 2		2	Suitable for intermittent use
	Class 3		3	Suitable for occasional use, but must NOT be worn continuously.
In practice only Class 1 optical glasses should be used. Class 2 & 3 are not usually seen in the UK				

Property	Details	Frame Marked	Lens Marked	What it means in practice
Optical Test	Misting/fogging		N	Resist misting and fogging
	Mechanical Damage		K	Resist surface damage by fine particles, that is antiscratch.
Many glasses may be anti-fog or anti-scratch but not carry the above markings as this is an optional test.				

Strength of the lens

- F- withstand impacts against small objects traveling up to 45 meters per second
- B- withstand impacts against small objects traveling up to 120 meters per second
- A- withstand impacts against small objects traveling up to 190 meters per second
- T- withstand impacts at extreme temperatures.

Radiation Protection

- 2- UV Protection (EN170). The number 2 indicates the filter may effect colour recognition
- 2C or 3- UV Protection (EN170). The number 2C indicates the filter allows good colour recognition
- 4- Infrared Protection (EN171).i.e. protection from heat
- 5- Solar Protection (EN172). i.e. 100% UV sun glare protection- with no infrared (IR) protection
- 6- Solar Protection (EN172). i.e. 100% UV sun glare protection- with infrared (IR) protection

Lens Shading

- 1.2- Allows more than 74.4% light transmission, but less than 100%
- 1.7- Allows more than 43.2% light transmission, but less than 58.1%
- 2.5- Allows more than 17.8% light transmission, but less than 29.1%
- 3.1- Allows more than 8.0% light transmission, but less than 17.8%

Scale number- for oculars with filtering effect only. Higher numbers have a stronger filtering effect (eg are darker for welding). Scale number consists of a code number and a shade number separated by a hyphen, except for welding filters which have no code number. For example, an IR filter with shade number 4 has the scale number 4-4.

Welding filters - see BS EN 169 and BS EN 379

Shade number between 1.2 and 16. Suffix a denotes filter for use in gas welding with flux.

UV filters - see BS EN 170

2- or 3- minus code number denoting UV filter without or with good colour recognition respectively, plus shade number between 1.2 and 5.

IR filters - see BS EN 171

4- minus code number for IR filters, plus shade number between 1.2 and 10.

Sun-glare - see BS EN 172

5- or 6- minus code number for sun-glare filters without or with IR specification respectively, plus: shade number between **BS EN 1.1 and 4.1 and BS EN 1836.**

Optical class

1, 2 or 3- indicates optical quality of the ocular. Class 1 is the best.

Standard	Symbol	Explanation
EN 166	1	Optical Class
EN 166	F	Low Energy Impact
EN 166	T	Resistance to high speed particles at extreme temperature
EN 166	B	Medium Energy Impact
EN 166	9	Non adherence of molten metal and resistance to penetration of hot solids
EN 166	3	Protection against liquid droplets/splashes
EN 166	8	Protection against Short Circuit Electric Arc
EN 169	3	Filters for personal eye-protection equipment used in welding and similar operations. Scale Number 3
EN 169	5	Welding and braze welding of heavy materials. Welding with emissive fluxes (notable light alloys) Oxygen Cutting. Scale Number 5
EN 170	2-1, 2	For use with sources which emit predominantly UV Radiation at wave lengths shorter than 313nm and when glare is not an important factor. This covers the UVC and most of the UVB bands. Low pressure mercury lamps such as germicidal lamps.
EN 171	4-5	Protection against Infra Red radiation filters. Typical application in terms of mean temperature sources up to 1320°C.
EN172	5-3, 1	Sun-glare filters for industrial use - meets requirements for recognition of signal lights.