

bolle
SAFETY



TRAINING **BOOKLET**

Eye protection and standards

INNOVATIVE **VISION**

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THE HUMAN EYE IS A FRAGILE AND VULNERABLE ORGAN.

There are many types of eye injury with severity ranging from simple irritation to total blindness. This is why it is so important to be aware of all potential risks in the workplace.

The following training booklet will therefore explain in detail all of these risks and the standards and types of protection associated with them, thus enabling you to respond effectively to users' requests.

First and foremost, it is vital to emphasise that the selection of eye protection is the sole responsibility of the employer and in no way that of the manufacturer, supplier or the employee.

The duty of the employer is to clearly assess the nature and extent of the risk in order to provide the right equipment. This analysis must be entrusted to a qualified person with suitable training.

The duty of the manufacturer or the supplier is then to offer the employer suitable personal protection to eliminate or reduce the identified risk.

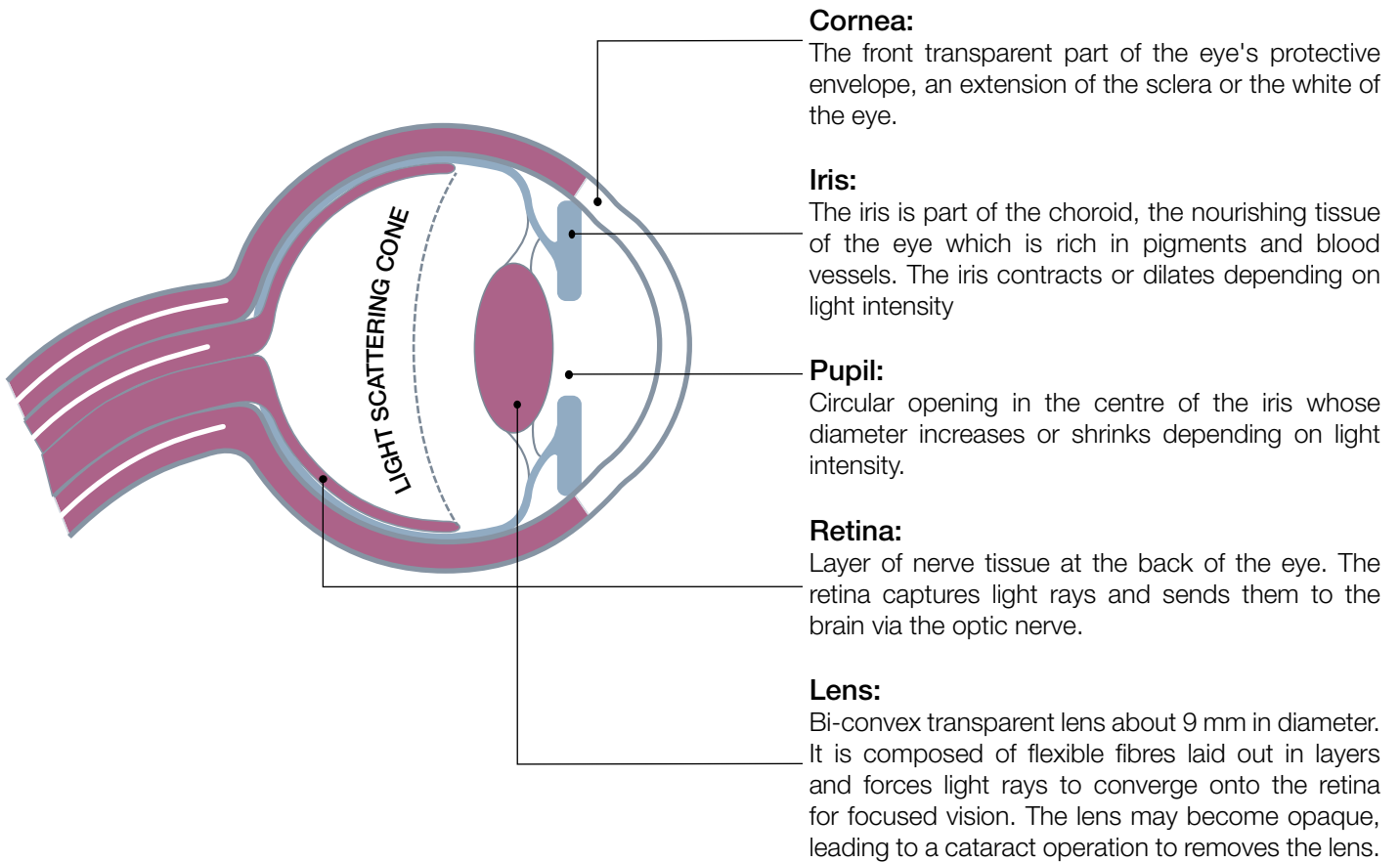
THE EYE

//01

VISION
KEY FIGURES
PPE REGULATION

VISION

ANATOMY OF THE EYE



KEY FIGURES

ACCIDENTS AT WORK / EYES

THE EXAMPLE OF FRANCE

11,485

periods of sick leave recorded in 2013 including 70 permanent stoppages

63%

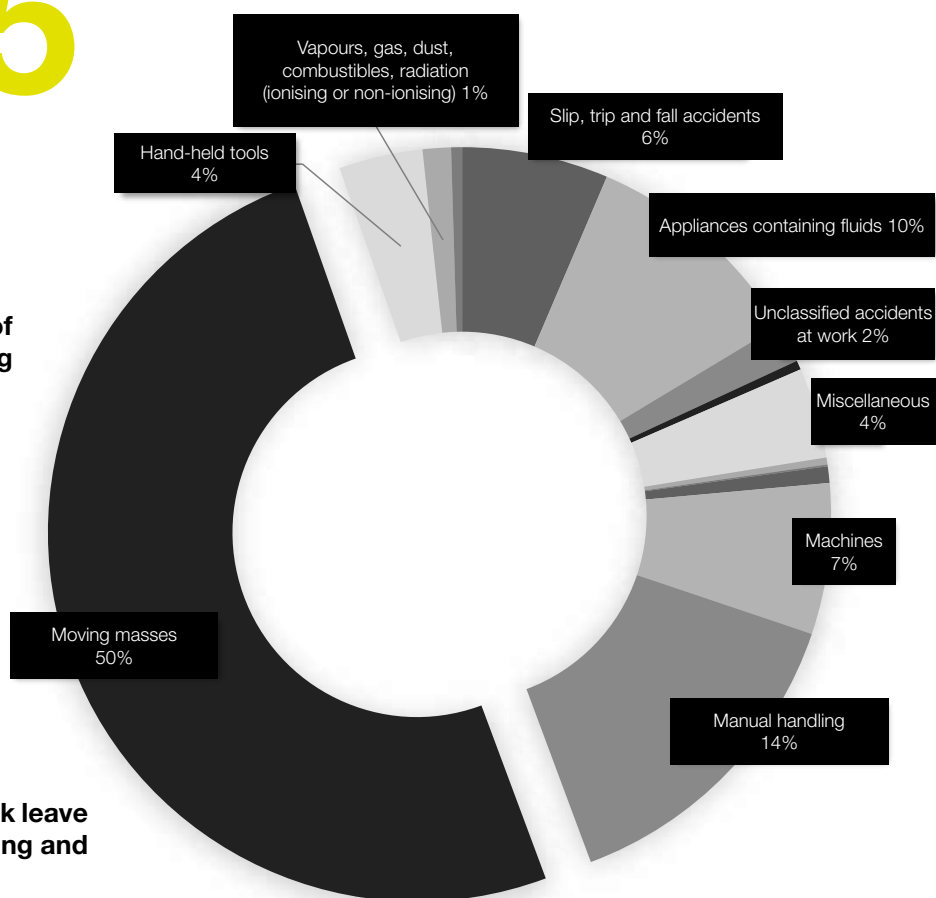
An encouraging figure: the number of accidents at work in France concerning the eyes fell between 1990 and 2013!

113,797

days off work which could have been avoided

€31,000

This is the average cost of a period of sick leave lasting longer than 150 days in the building and public works sector in 2013



BUT 90%

of eye injuries can be avoided by using suitable glasses and shields!



PPE REGULATIONS

BECAUSE EYE PROTECTION IS COMPULSORY

Eye protection?

European directive 89/656 makes the wearing of eye or facial protection compulsory for:

- Welding, sanding and cutting work
- Drilling and chiselling
- Stonework
- Handling nail guns
- Using machines which remove shavings when processing materials, producing short chips
- Stamping work
- Removal and fragmentation of shards
- Working with jets of abrasive granules
- Handling acid and alkaline products, disinfectants and corrosive detergents
- Handling liquid spray equipment
- Handling molten metal and working in proximity to it
- Activities in environments with radiant heat
- Laser work

What are the obligations for companies?

- › Identify all the risks in the workplace and assess the level of risk
- › Remove the risk, set up collective protective measures and if this is not possible or is insufficient, provide personal protective equipment
- › Consult the company health and safety commission
- › Select PPE adapted to the risks to be covered and check the validity of this choice
- › Inform employees of the risk, the conditions for use of the PPE and the instructions
- › Train employees in the use of PPE
- › **Provide employees with their own PPE free of charge**
- › **Ensure the PPE is actually used and is used properly**
- › Ensure the condition of the PPE remains compliant
- › Check some PPE regularly

What are the obligations for employees?

- › The obligations of employees stem directly from the company's internal regulations, approved by the Labour Inspectorate and deemed to be the practical and appropriate application of the Labour Code .



Compulsory PPE for the eyes and face

STANDARDS

//02

EYE PROTECTION
RADIATION
WELDING

STANDARDS FOR EYE PROTECTION

EN166

The reference standard

Directive 89/686/CEE makes **CE** marking and the logo of the company on all personal protective equipment compulsory.

EN166: the guarantee of adequate marking and the quality of the equipment

The EN166 standard applies to all eye protection and guarantees adequate marking and the quality of the equipment. Its purpose is to guarantee protection against:

- ▶ impacts characterised by varying degrees of severity;
- ▶ optical radiation;
- ▶ molten metal and hot solids;
- ▶ droplets and splashes;
- ▶ dust;
- ▶ gases;
- ▶ short-circuit electric arcs;
- ▶ or any combination of these risks.



Standard EN166 also defines the basic characteristics to which all eye protection must conform with regard to two criteria: the optical quality and the minimum strength.

While all eye protection must be EN166 certified, all filters and equipment are also covered by specific standards which must be understood in order to ensure protective equipment is adapted to the activity of its wearer.

EN166



Standards for protection against **artificial and natural radiation**

- ▶ EN170
- ▶ EN171
- ▶ EN172



Standards relative to **welding work** for equipment and against radiation

- ▶ EN169
- ▶ EN175
- ▶ EN379



Standards relative to **laser work**

- ▶ EN207
- ▶ EN208

STANDARDS

FOR PROTECTION AGAINST RADIATION

EN170 **ULTRAVIOLET RADIATION**

European standard EN170 specifies the scale numbers and requirements relative to the transmission factor of filters protecting against **ultraviolet radiation/sources of artificial light**.

The protection filters specified in this standard are not suitable for looking directly at bright light sources such as high-pressure xenon arc lamps or looking directly or indirectly at electric welding arcs. In this case a welding filter must be used as specified in standard EN169 with a scale number suitable for the light source.

EN171 **INFRARED RADIATION**

This European standard specifies the scale numbers and requirements relative to the transmission factor of **filters protecting against infrared radiation**.

EN172 **SOLAR FILTERS FOR USE IN THE WORKPLACE**

EN172 defines the scales and requirements of the corresponding transmission factor for **solar filters for industrial use/natural light sources**.



STANDARDS RELATIVE TO WELDING

EN169 WELDING FILTERS

Specifies the scale numbers and requirements relative to the transmission factor of filters designed to **protect operators carrying out work involving welding, hard soldering, arc gouging using compressed air and plasma stream cutting**. It also includes requirements relative to dual scale number welding filters.

EN379 VARIABLE OR DUAL SCALE WELDING PROTECTION FILTERS

EN379 specifies the requirements relating to welding filters which **automatically switch their transmission factor in the clear zone** to a lower value when a welding arc is struck (known as welding filters with switchable scale numbers).

The specifications of the standard apply if such a filter is to be used for the **continuous observation of the welding** process and if it is only used during the period where the arc is ignited.

The standard also specifies the requirements for welding filters with different welding scale numbers in the clear zone (called welding filters with a double scale number).

These filters are used for welder protective eyewear or system-mounted protection.

EN175 WELDING GOGGLES AND EQUIPMENT

This European standard specifies the requirements and test methods related to **personal protective equipment used to protect the operator's eyes and face against harmful optical radiation and other specific risks due to customary welding or cutting processes or other associated techniques**.

The standard specifies protection, **including ergonomic** aspects, against various risks or hazards including radiation, fire, mechanical and electrical risks.

This standard defines the terms used and specifies the requirements related to materials, design and manufacture.

Standards EN170, EN171 and EN172 also apply for welding and laser work.

MATERIALS

//03

LENS
FRAME

MATERIALS

LENS



POLYCARBONATE

Lighter and more resistant to impacts than plastic whilst being less sensitive to scratches, polycarbonate is the perfect material for safety spectacles and sports glasses, for which light weight and resistance are much sought-after assets. Excellent resistance in extreme temperatures: -80°C to $+135^{\circ}\text{C}$. Polycarbonate absorbs 100% of UV radiation. It is more resistant over time with regard to mechanical risks (impacts, scratches, etc.).

CR39 / ORGANIC

This is a plastic resin. CR39 is particularly used against chemical risks as it withstands abrasion better than polycarbonate. It is also very strong and light-weight and resists fogging better. However, it has two major disadvantages: it only absorbs part of ultraviolet radiation (the UV400 option can be applied to rectify this) and the soft surface is easily scratched (an anti-scratch coating can be applied to rectify this). It should also be noted that at equal power, organic lenses are thicker than mineral or polycarbonate lenses.

MINERAL

This material is composed of sand and chemical elements that constitute traditional glass. Its main properties are excellent optical quality and scratch resistance (as it is very hard). Thus, nearly 92% of light is transmitted by mineral glass. In addition to its high weight (two and a half times that of polycarbonate or CR39), its main disadvantage lies in its low impact resistance and the fact that it breaks into several small pieces that could damage the eye.

CELLULOSE ACETATE / CELLULOSE PROPIONATE

With its excellent resistance to impacts and scratches, this is the material of choice for extreme environments. With low electrostatic and flammability characteristics, it offers good resistance to alcohols, petrol, oil, grease and fuel oil. This material is pleasant to touch and can also be sterilised. It has a lower resistance to temperature as the acetate loses its flexibility.

FRAME

POLYCARBONATE

Lighter and more resistant to impacts than plastic whilst being less sensitive to scratches, polycarbonate is the perfect material for safety spectacles and sports glasses, for which light weight and resistance are much sought-after assets. Excellent resistance in extreme temperatures: -80°C to $+135^{\circ}\text{C}$. Polycarbonate absorbs 100% of UV radiation. It is more resistant over time with regard to mechanical risks (impacts, scratches, etc.).

NYLON

Flexible with excellent resistance to wear, chemical products (fuel, paint, lacquer, lubricants, etc.) and heat but poor resistance to humidity.

THERMOPLASTIC RUBBER (TPR)

A compromise between rubber and plastic, TPR has a pleasant, soft texture. It is a flexible "non-slip" material which is resistant to vibrations and extreme temperatures and which absorbs impacts.

MATERIALS

FRAME



ETHYLENE VINYL ACETATE (EVA)

Light and soft to the touch, this food-grade material is highly resistant to petroleum products and impacts even at low temperatures. Good resistance to bad weather and UV rays. Can be easily torn and distorted.

STYRENE BUTADIENE RUBBER (SBR)

The properties are similar to natural rubber but with improved ageing and heat resistance. Highly resistant to abrasion and good resistance to many inorganic chemical products.

NEOPRENE

Resistant to ozone and hydrocarbons (oil, petrol) and ageing. Light-weight, thermal insulation, elasticity and resistance to crushing and damage. Resists temperatures up to + 120°C. Not totally impermeable, it is sensitive to storage.

ALUMINIUM

Corrosion resistant, light-weight and attractive appearance.

THERMOPLASTIC POLYAMIDE / ZYTEL

Resistant to impacts, traction and distortion, polyamide also has excellent resistance to heat, chemical products and electricity. It is one of the strongest thermoplastics and is increasingly used for technical applications.

NICKEL

Nickel is a strong, malleable, ductile material whilst still being hard, resistant to oxidation and corrosion.

POLYVINYL CHLORIDE (PVC)

PVC is light-weight, malleable, gas- and liquid-tight and has good insulation properties (electrical, thermal and acoustic). However, it has low resistance to UV rays and is toxic in case of fire or combustion as it emits hydrochloric acid. However, it is self-extinguishing.

THERMOPLASTIC ELASTOMER (TPE)

TPE has the elastic properties of the elastomers. It has excellent wear resistance and good chemical resistance against mechanical grease and oils. Excellent resistance to extreme conditions: between -70°C and +200°C.

THERMOPLASTIC POLYURETHANE (TPU)

Excellent mechanical resistance, high resistance to abrasion, very flexible (between -40°C and +100°C), TPU is also resistant to ageing and ozone. Good resistance to mineral and silicone grease and oils. Low flammability.

THERMOPLASTIC VULCANIZATE (TPV)

Excellent resistance to UV rays and ozone. Excellent resistance from -40°C to +130°C.

RISKS

//04

IDENTIFY THE RISKS

MECHANICAL RISKS

CHEMICAL RISKS

ELECTRICAL RISKS

THERMAL RISKS

RISKS LINKED TO RADIATION

IDENTIFY THE RISKS






AND THE APPROPRIATE EYE PROTECTION

What type of protection should you choose?

Assessment of occupational risks involves identifying, assessing and ranking risks in the workplace to implement relevant preventive measures.

It is the initial step in occupational health and safety. It is vital to check that the risk identified, the directives of the standard and the markings on the product all match.

Standard EN 166 identifies the basic risk and risks concerning the eyes linked to the field of use, as follows:

RISKS	DESCRIPTION OF THE FIELD OF USE	TYPICAL USE	INSTRUCTIONS ON THE EQUIPMENT
Mechanical 	Particle projection	Grinding, drilling, descaling, fragmentation, polishing, sanding, riveting, stamping, shredding using hammers, crushing, heavy sawing, planing, handling wires and strips, hammering, unpacking, nailing, punching using a press, lathe-work, etc.	Frame and lens marking
Linked to radiation 	Presence of visible, ultraviolet, infrared and solar radiation	Reflections, solar radiation and bright lights, welding arc reflection, photographic reproduction and welding procedures: flame cutting, welding, brazing, furnace work, metal casting, spot welding, photographic reproduction, etc.	Lens marking
Chemical 	Presence of liquids in the form of droplets or splashes, dust or dust particles, gas vapours, vaporised droplets, and smoke. Splashes of acid, chemical burns.	Carpentry, sanding, light metalwork and machining, exposure to dust and wind, resistance welding (without exposure to radiation), handling sand, cement and aggregates, painting, concreting, plastering, batching and mixing materials, sand and water blasting, shot-blasting, sprayed concrete, etc. Handling acids and alkalis, degreasing, chemical stripping and electroplating, glass breakage, spraying chemical products, laying liquid asphalt, etc.	Frame marking
Thermal 	Splattering of molten metal, heat, sparks and splashes of molten material	Babitting, casting, pouring molten metal, brazing, soldering, spot welding, stud welding, hot-dip operations.	Frame and lens marking
Electrical 	Electric arc produced when electrical equipment short-circuits	Electric welding procedures: coated electrodes, TIG, MIG-MAG, grinding, etc.	Frame and lens marking

IDENTIFY THE RISKS

WHAT TYPE OF PROTECTION SHOULD YOU CHOOSE?



PROTECTING YOURSELF FROM MECHANICAL RISKS

Grinding work, particle projections, projections of metal filings or debris from tools.



Risks or use	Symbol*	Safety spectacles	Safety goggles	Face shields	Standard
Low energy impact 45 m/s	F				EN 166
Medium energy impact 120 m/s	B				EN 166
High energy impact 190 m/s	A				EN 166

The F, B or A symbol must imperatively be indicated on the lens and the frame to guarantee protection from mechanical risks. If the symbols differ, the symbol representing the lowest resistance is applied to the protection as a whole.



PROTECTING YOURSELF FROM ELECTRIC RISKS

Protection from live contact and short-circuit electric arcs.



Risks or use	Symbol*	Safety spectacles	Safety goggles	Face shields	Standard
Short-circuit electric arc	8				EN 166

The 8 symbol must imperatively be indicated on the lens and the frame to guarantee protection from electrical risks.



PROTECTING YOURSELF FROM THERMAL RISKS

Sprays of hot liquids or solids, intense heat radiation, radiating heat from furnaces.



Risks or use	Symbol*	Safety spectacles	Safety goggles	Face shields	Standard
Splatters of molten metals and hot solids	9				EN 166

The 9 symbol must imperatively be indicated on the lens and the frame to guarantee protection from thermal risks.



PROTECTING YOURSELF FROM RADIATION RISKS

Exposure of the eyes to high intensity, ultraviolet, infrared and visible light sources, welding activities, steelworks, surgery.



Risks or use	Symbol*	Safety spectacles	Safety goggles	Face shields	Standard
Ultraviolet radiation	2				EN 166 EN 170
Infrared radiation	4				EN 166 EN 171
Solar radiation for industrial use	5 or 6				EN 166 EN 172
Electric welding	EN 175 for the hood EN 379 for the filter				EN 166-169 EN 175 EN 379
Gas welding	1.7/3/5				EN 166 EN 169
Laser radiation	R1 to R5 LB1 to LB10				EN 207 EN 208

The standard is identified on the lens markings.



PROTECTING YOURSELF FROM CHEMICAL RISKS

Flying particles of toxic dust, aerosols, dangerous liquids, gas or toxic vapours.



Risks or use	Symbol*	Safety spectacles	Safety goggles	Face shields	Standard
Liquid droplets	3				EN 166
Liquid splashes	3				EN 166
Large dust particles > 5 microns	4				EN 166
Gas and fine dust particles < 5 microns	5				EN 166

The 3, 4 and 5 symbol or symbols must imperatively be indicated on the frame. If none of these symbols is indicated in the markings, then the equipment is not suitable for chemical risks.

CHEMICAL RISK



The mechanical risk is defined as:

Impacts, flying chips or solid particles.

Mechanical risks are mainly present during machining operations when sharp-edged particles or those with high kinetic energy are thrown out.










To protect you against mechanical risks, Bollé Safety has developed a wide range of safety eyewear, including safety spectacles, safety goggles and safety face shields.

Practical examples:

Metal chips, shards or particles coming from tools, etc.

To choose between safety spectacles, safety goggles and safety face shields, the type and extent of the risk must be known:

- for a turning operation, safety spectacles may be sufficient.
- for cutting work, a face shield is essential to protect the eyes and face.

Risks or application	Symbol / marking to identify	Safety spectacles	Safety goggles	Face shields	Reference standard
Minimum resistance to impact - 5.1 m/s **	S				EN166
Low energy impact - 45 m/s **	F or F T*				EN166
Medium energy impact - 120 m/s **	B or B T*	Not suitable			EN166
High energy impact - 190 m/s **	A or A T*	Not suitable	Not suitable		EN166

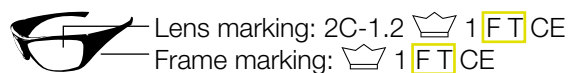
* The letter T, immediately after the mechanical strength symbol, authorises use for high speed particles at extreme temperatures (-5°C/+55°C)..

Is your equipment suitable for mechanical risks?

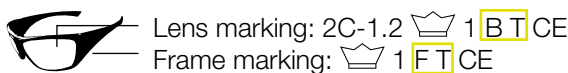
To check that your eyewear + frame are suitable for the mechanical risk identified, the symbol S, F, B or A must be marked on the frame and lens.

If the symbols differ, the symbol representing the lowest resistance applies to the whole protection equipment (see example 2).

Example:



1 - In this example, the symbol F on both the lens and the frame indicates that the whole item of equipment is suitable for a low energy impact - 45 m/s, hence F.



2 - In this example, the mechanical resistance markings are different. F being the symbol of lowest mechanical resistance, the equipment is deemed to protect against a risk of low-energy projectiles - 45 m/s, hence F.

** Test methods:

S- The lenses must withstand the impact of a steel ball having a nominal diameter of 22 mm and a minimum weight of 43 g hitting them at a speed of approximately 5.1 m/s.

F- The lenses must withstand the impact of a steel ball having a nominal diameter of 6 mm and a minimum weight of 0.86 g hitting them at a speed of approximately 45 m/s.

B- The lenses must withstand the impact of a steel ball having a nominal diameter of 6 mm and a minimum weight of 0.86 g hitting them at a speed of approximately 120 m/s.

A- The lenses must withstand the impact of a steel ball having a nominal diameter of 6 mm and a minimum weight of 0.86 g hitting them at a speed of approximately 190 m/s.

CHEMICAL RISKS



Chemical and biological risks are defined as:

Splatters of hazardous liquids, toxic dust, gas, toxic vapours.

Chemical risk occurs when a substance splashed or present in the environment reacts with the components of the eye or the skin and it is present in most industrial sectors.




This risk is particularly present in the medical field, the agri-food industry or in waste management, where micro-organisms are likely to contaminate individuals.

To prevent any risk of chemical splashes, Bollé Safety offers a wide range of safety goggles and face shields for protection against chemical and biological risks.

Practical examples:

Dust, aerosols, liquids, gas or vapours.

To choose between safety goggles and safety face shields, the type and extent of the risk must be known. In all cases, safety spectacles are not adapted to chemical risks.

Risks or application	Symbol / marking to identify	Safety spectacles	Safety goggles	Face shields	Reference standard
Liquid droplets	3	Not suitable	 Ventilated or sealed goggles	Not suitable	EN166
Liquid splashes	3	Not suitable	Not suitable		EN166
Large dust particles > 5 microns	4	Not suitable	 sealed goggles	Not suitable	EN166
Gas and fine dust particles < 5 microns	5	Not suitable	 sealed goggles	Not suitable	EN166

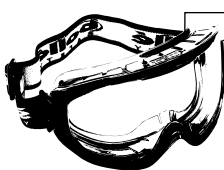
Is your equipment suitable for chemical risks?

To check that your equipment is suitable for the chemical risk identified, the symbol 3, 4 or 5 must be marked on the frame.

If no figure appears on the frame, the equipment is not suitable for chemical risks.

Warning: in the case of chemical risks, it is the frame marking only which indicates the symbol for chemical resistance.

Example:



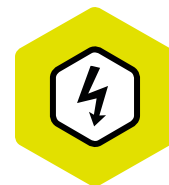
Frame marking:  EN166 3 4 **BT** CE
Lens marking: 2C-1.2  1 B T CE

In this example, the chemical resistance markings show two levels of protection: 3 and 4. The frame is sealed as the symbol 4 appears, and these goggles protect against droplets and splashes of liquid (symbol 3) and against large dust particles > 5 microns (symbol 4).

Did you know?

The better the sealing of your goggles, the higher the level of protection against chemical risks.

Equipment which is totally sealed thus protects against the ingress of any chemical or biological products or particles into the protected eye area. Always examine the condition of your goggles carefully - if the frame or lens is distorted, damaged or has a hole, your equipment can no longer protect you effectively against the chemical risk.



ELECTRICAL RISKS

Electrical risk is defined as:

Live contact and short-circuit electric arcs.

Eye protection against short-circuit electric arcs must be safety face shields only. It must not have exposed metal parts and all the outer edges of the protection must be rounded, chamfered or otherwise treated so that there are no sharp edges.

The consequences of electric shock can be cornea burns, retinal lesions and conjunctivitis.

Practical examples:

Arc eye, electric arcs

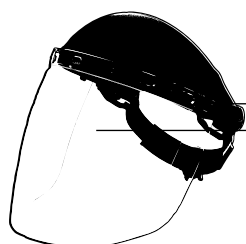
Risks or application	Symbol / marking to identify	Safety spectacles	Safety goggles	Face shields	Reference standard
Short-circuit electric arc	8	Not suitable	Not suitable		EN166

Is your equipment suitable for electrical risks?


To check if your equipment is suitable for the electrical risk identified, the symbol 8 must be marked on the lens and the frame.

If the symbol 8 does not appear on the frame or the lens, the equipment is not suitable for electrical risks.

Example:



Frame marking:  EN166 3 **8** BT 9 CE

Lens marking: 2C-1.2  1 BT **8** 9 CE

In this example, the electrical resistance marking appears both on the lens and the frame, thus guaranteeing protection against electrical risks for the entire equipment.



THERMAL RISKS


Thermal risk is defined as:

Splatters of hot liquids, intense thermal radiation.

Thermal risk occurs when liquids or hot solids are splashed or intense radiation is emitted.

Practical examples:

Radiant heat coming from ovens, splashes of molten metal or hot solids, etc.

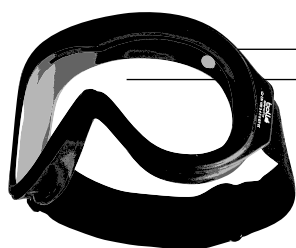
Risks or application	Symbol / marking to identify	Safety spectacles	Safety goggles	Face shields	Reference standard
Splatters of molten metals and hot solids	9	Not suitable			EN166

Is your equipment suitable for thermal risks?



To check if your equipment is suitable for the thermal risk identified, the symbol 9 must be marked on the lens and the frame.

If the symbol 9 does not appear on the frame or the lens, the equipment is not suitable for thermal risks. The symbol 9 indicates the non-adherence of molten metal and resistance to penetration by hot solids (if necessary) on the equipment.

Example:



Frame marking:  EN166 3 4 5 B T  CE

Lens marking: 2C-1.2  1 B T  K N CE

In this example, the thermal resistance marking appears both on the lens and the frame, thus guaranteeing protection against thermal risks for the entire equipment.

RISKS LINKED TO RADIATION



Risks linked to radiation are defined as:

Ultraviolet, infrared, visible light, gas welding, electric welding, laser.

Optical radiation is present in many activities in industrial, medical or commercial fields.

Welding, steel works and surgical processes are all concerned.

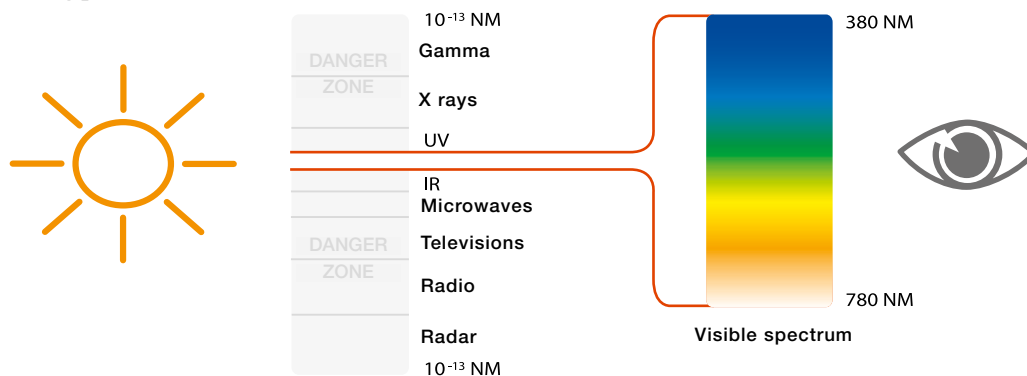
Over-exposure of the eyes to high intensity sources can cause burns and lesions of the eye.

Bollé Safety has developed safety spectacles, safety goggles, safety face shields and welding helmets to protect against optical radiation.

Practical examples:

Invisible UV radiation, visible and invisible IR radiation, etc.

The various types of radiation:



Gamma radiation: very dangerous, can penetrate through cement and even lead. It destroys cells in living organisms.

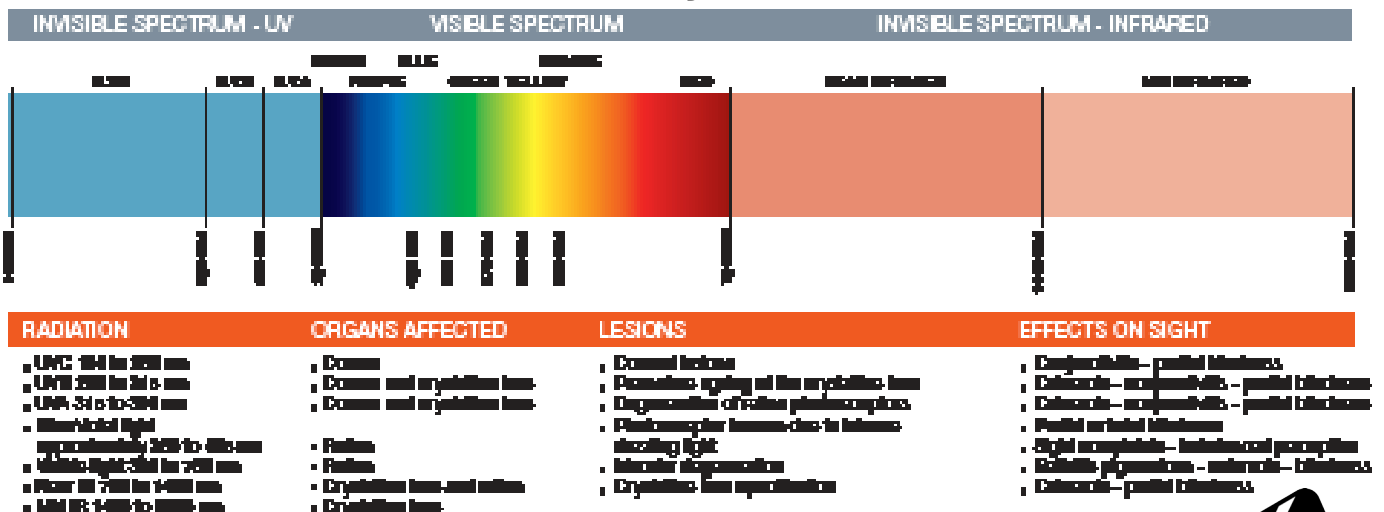
X-rays: can go through our body's tissue but are stopped by our bones – this is why radiography is possible.

Ultraviolet radiation: comes from the sun, is partially blocked by the ozone layer surrounding the Earth. Those that pass through delight sunbathers but over-exposure can be very damaging.

Infrared rays: are emitted by all warm objects. These rays are not visible but their heat can be detected.

Radio waves: are used to transmit sounds, images and digital data. The human eye is not able to identify the various elements of a ray – it only sees the result. The human eye can only see wavelengths between 380 and 780 nanometres in length – this is known as the "visible spectrum".

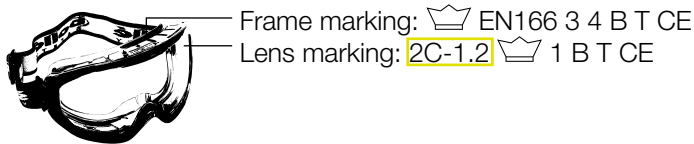
Visible effects of UV and IR on the eye



Is your equipment suitable for the radiation you have identified?

- To check if your equipment is suitable for the specific type of radiation identified, a code and a filter index must appear on the lens of your equipment.
- The first figure indicates the filter code, i.e. the type of filtering provided by the lens, and the following figure indicates the scale number, i.e. the filtering shade.
- Warning, for lenses filtering radiation linked to welding there is no filter code. The single figure indicates the filtering shade. The higher this figure, the stronger the radiation filtering.

Example:





	Ultraviolet filters		Infrared filters	Solar filters		Welding filters
Code	2 Ultraviolet filter, colour recognition may be affected. 2C or 3: Ultraviolet filter with good colour recognition. 3 Former code, equivalent to 2C: Ultraviolet filter with good colour recognition.		4 Infrared filter (artificial radiation)	5 Solar filter without infrared protection	6 Solar filter with infrared protection (solar IR)	X: The scale number for welding filters does not include a code number. It only features the protection class.
Scale number: The scale number is a combination of the code number and the protection code for a filter. This number defines the transmission factor of a filter and is represented by a scale number.	2-1.2 1-1.4 2-1.7 2-2 2-2.5 2-3 2-4 2-5	3-1.2 3-1.4 3-1.7 3-2 3-2.5 3-3 3-5	4-1.2 4-1.4 4-1.7 4-2 4-2.5 4-3 4-4 4-5 4-6 4-7 4-8 4-9 4-10	5-1.1 5-1.4 5-1.7 5-2 5-2.5 5-3.1 5-4.1	6-1.1 6-1.4 6-1.7 6-2 6-2.5 6-3.1 6-4.1	1.2 1.4 1.7 2 2.5 3 4 4a 5 5a 6 6a 7 7a 8 9 10 11 12 13 14 15 16



RISKS



LINKED TO RADIATION // WELDING

Risks or application	Scale number	Safety spectacles	Safety goggles	Face shields	Reference standard
Gas welding	1.7 - 3 - 5*				EN166 EN 169

MARKING OF FIELD OF USE SYMBOLS

- Frame: no symbol
- Lenses*:
 - for welding assistants: 1.2 1.4 1.7 2 2.5 3.4
 - for welding and hard soldering: 4 5 6 7
 - for flame cutting: 5 6 7

The symbols above correspond to protection classes and supplement the mechanical resistance symbols S - F - B and A and possibly other symbols for the field of use and the optical class.

Risks or application	Scale number	Spectacles & face shields	Hand-held welding shield	Welding helmet	Reference standard
Electric welding	9 to16*	Not suitable			EN166 - 169 EN 175 EN 379

MARKING OF THE MECHANICAL RESISTANCE SYMBOLS

- Shield (optional marking):
 - S (increased robustness)
 - F (low energy)
 - B (medium energy)
- Filter: possible symbols S - F or B


WEIGHT MARKING

- For hand-held shields: compulsory if > 500 g.
- For helmets: compulsory if > 450 g.

MARKING OF FIELD OF USE SYMBOLS

- Shield (optional marking):
 - 9 (molten metals and hot solids)
 - W (immersion in water)
- Filter: Scale of 9 to 16

N.B. The symbols for the field of use of the filters correspond to protection classes and supplement the optical class symbols and other symbols of mechanical resistance.



Did you know?

There are various sources of UV radiation which are very dangerous for the eyes, many of which are linked to industrial activity.




Among them are:

- **Welding arcs**, which cause a significant amount of UV radiation. Closing your eyes is not sufficient to protect yourself against it. It is therefore vital to wear suitable safety goggles containing a quartz envelope in particular as the glass does not allow the UV radiation to pass through.
- **Low-pressure fluorescent tubes** (sun beds) and high-pressure lamps
- **UV diodes**: developed in Japan. These diodes are used in many applications (disinfection of instruments, engraving printed circuits, spectroscopy and fluorescence microscopy in laboratories, etc.)



RISKS

LINKED TO RADIATION // ULTRAVIOLET

Risks or application	Scale number	Safety spectacles	Safety goggles	Face shields	Reference standard
Ultraviolet radiation 210 to 380 nm	2, 2C or 3*				EN166 EN170

MARKING OF FIELD OF USE SYMBOLS

- Frame: no symbol
- Lenses*: code 2, 2C or 3

2: code number of the ultraviolet filter for which colour recognition may be affected.

2C: code number of the ultraviolet filter with good colour recognition.

3: ultraviolet filter, good colour recognition (code replaced by 2C)

These codes must be followed by a scale number which defines the transmission factor of the lens.

*The symbols above correspond to protection classes and supplement the mechanical resistance symbols S - F - B and A and possibly other symbols for the field of use and the optical class.

Recommendation concerning scale degrees (source: EN170):

Scale number	Colour recognition	Typical applications	Example of sources
2-1.2 2-1.4 2-1.7	May be affected, unless otherwise stated "2C-protection class"	To be used with sources which emit predominantly ultraviolet radiation at wavelengths < 313 nm and when glare is not an important factor. This applies to U.V.C radiation and to a major part of U.V.B. radiation.	Low pressure mercury vapour lamps, such as those used to stimulate fluorescence or "black lights", actinic and germicide lamps.
2-2 2-2.5	May be affected, unless otherwise stated "2C-protection class"	To be used with sources which emit strong radiation both in the UV spectral fields and in the visible field and which therefore require attenuation against visible radiation.	Medium pressure mercury vapour lamps such as photo-chemical lamps.
2-3 2-4			High-pressure mercury vapour lamps and metal halide lamps, such as sunlamps.
2-5			Pulsed lamp systems. High and very high pressure mercury vapour lamps and xenon lamps such as sunlamps.



Did you know?

All lenses marked with a code 2, 3 and 5 filter UVA and UVB radiation, whatever their colour. It is the quality and type of material used to manufacture the lenses which give them their filtration quality. The colour (clear, yellow, brown, smoke, etc.) is a "comfort" colour. Only the indication of the filter code can tell you if it offers proper protection against ultraviolet radiation.



RISKS

LINKED TO RADIATION // INFRARED

Risks or application	Scale number	Safety spectacles	Safety goggles	Safety facial shields	Reference standard
Artificial infrared radiation - 780 to 2000 nm	4				EN166 EN171

MARKING OF FIELD OF USE SYMBOLS

- Frame: no symbol
- Lenses*: code 4

This code must be followed by a scale number which defines the transmission factor of the lens.

*The symbols above correspond to protection classes and supplement the mechanical resistance symbols S - F - B and A and possibly other symbols for the field of use and the optical class.



RISKS LINKED TO SOLAR RADIATION FOR INDUSTRIAL USE

Risks or application	Scale number	Safety spectacles	Safety goggles	Face shields	Reference standard
Ultraviolet radiation 280 to 380 nm & UV radiation in natural light	5 or 6				EN166 EN172

MARKING OF FIELD OF USE SYMBOLS

- Frame: no symbol
- Lenses*: code 5 or 6
 - 5: number of the solar filter code without infrared protection.
 - 6: number of the solar filter code with infrared protection.

These codes must be followed by a scale number which defines the transmission factor of the lens.

Table of shading scale numbers:

Scale number	Use
5-1.1 and 6-1.1	Used for some photochromatic filters in a clear state
5-1.4 and 6-1.4	Very clear filter
5-1.7 and 6-1.7	Clear filter
5-2 and 6-2	Medium filter - Universal filter, recommended for most situations
5-2.5 and 6-2.5	Dark filter - Generally used in Central Europe
5-3.1 and 6-3.1	Very dark filter, to be used: <ul style="list-style-type: none">- in tropical and sub-tropical regions to observe the sky,- at high altitude for snow-covered areas- stretches of water and sand- chalk and lime quarries- not recommended for driving.
5-4.1 and 6-4.1	Extremely dark filter - filters very intense radiation. Not to be used for driving.

EN172 filters are not designed to look at the sun. To do so, it is essential to use welding protection filters having a scale number between 12 and 16.

*The symbols above correspond to protection classes and supplement the mechanical resistance symbols S - F - B and A and possibly other symbols for the field of use and the optical class.

Did you know?

Standard EN172 specifies a protection against "solar radiation for industrial use", meaning exposure to UV radiation linked to natural light. This standard is specific to PPE and does not apply either to glasses for skiing or any other type of glasses used for leisure activities, for which there are two specific standards: ISO 12312 and ISO 12311.



RISKS

LINKED TO RADIATION // LASER

There are two classifications for protection against laser radiation:







- Direct protection: between 180 nm and 1,000,000 nm, EN 207
- Adjustment work: between 400 nm and 700 nm, EN 208

The choice of filter is determined according to the following parameters:

- wavelength of the laser
- power of the laser
- diameter of the beam
- energy of the beam

In the case of pulsed lasers, additional parameters are necessary:

- energy per pulse
- duration of the pulse
- frequency of the pulse

Risks or application	Filter marking	Safety spectacles	Safety goggles	Safety facial shields	Reference standard
Laser radiation: direct exposure	LB1 to LB10				EN207
Laser radiation: Adjustment work / accidental exposure	R1 to R5				EN208

MARKING OF FIELD OF USE SYMBOLS

- Direct protection: LB1 to LB10
- Adjustment work: R1 to R5

The various parameters below are essential to calculate the scale number of the filter. This information will be supplied to Bollé through a questionnaire sent to the user.

MARKINGS

//05

INTRODUCTION
MARKING FOR GLASSES
MARKING FOR GOGGLES
MARKING FOR LASER GOGGLES
MARKING FOR FACE SHIELDS
MARKING FOR WELDING
SUMMARY OF MARKING & RISKS

MARKING AND PROTECTION

Safety lens and frame marking is specific to each product.

Certified by **independent laboratories**, this information guarantees protective eyewear quality and resistance.

Each marking corresponds to a specific use and protection.

To know the level of protection of the equipment, 2 types of marking must be identified:



- The lens marking:

whether for spectacles, goggles or a face shield, **a marking must be present on each lens**. It guarantees the quality of the lens. It indicates the type of filtration of the shield(s), identifies the manufacturer, the mechanical, electrical and thermal resistance, the optical class and the **CE** standard.



- The frame marking:

whether for spectacles, goggles or a face shield, **a marking must be present on the frame**. It guarantees the quality of the frame. It identifies the manufacturer and indicates the mechanical, electrical, chemical and thermal resistance, and the EN and **CE** standard.



It is vital to identify the markings to validate the various types of protection the equipment provides. Refer to the specific specifications to know and analyse the various markings.



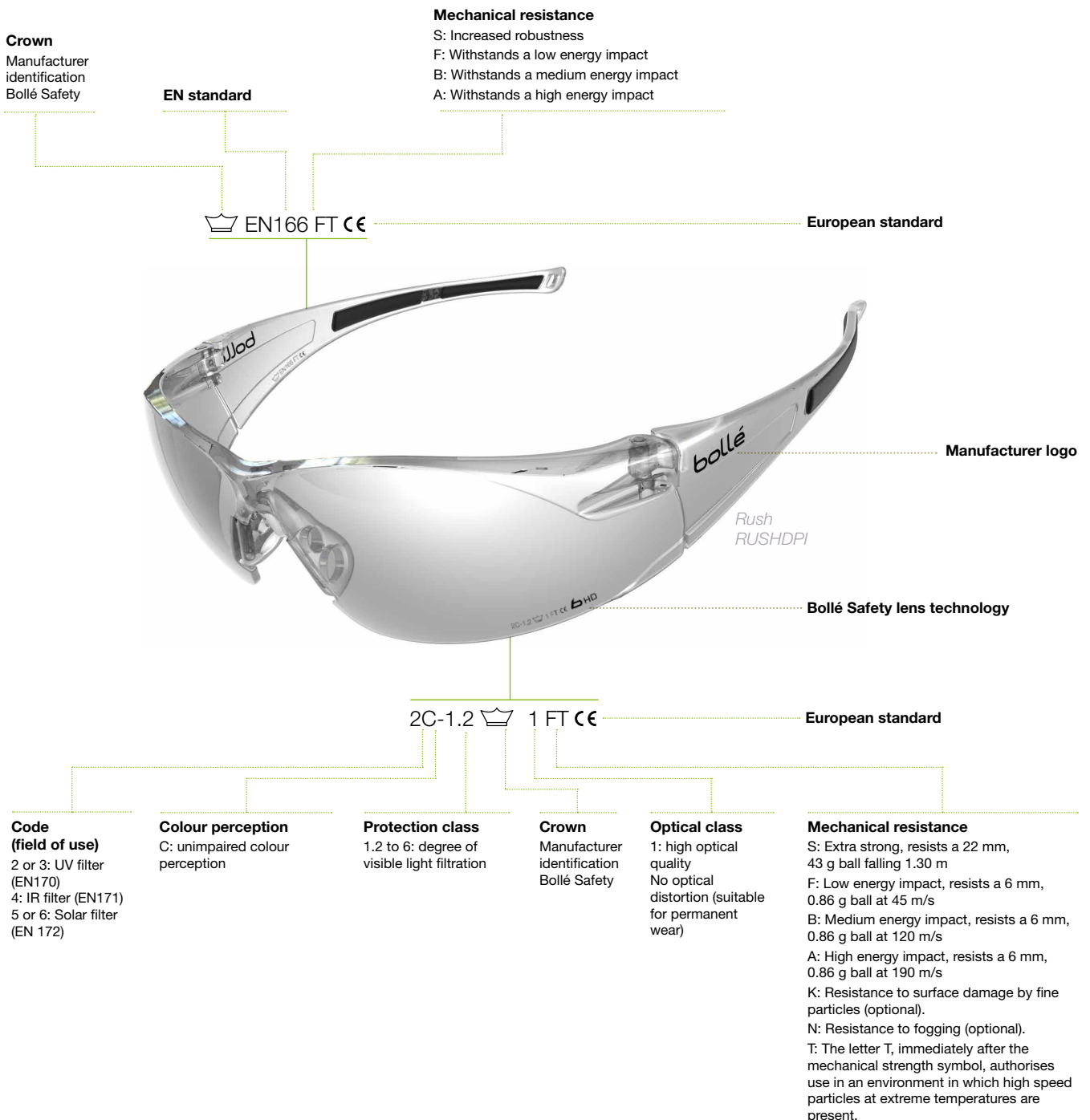


Did you know?

All products available on the European market must comply with the European standards. The logo **CE** must be present on personal protective equipment. Your supplier must be able to provide you with the CE declaration of compliance and instructions containing all the data concerning storage, conditions for use and maintenance of the equipment, the expiry date, the protection class, etc.

MARKING AND PROTECTION

Identify and understand the markings on glasses



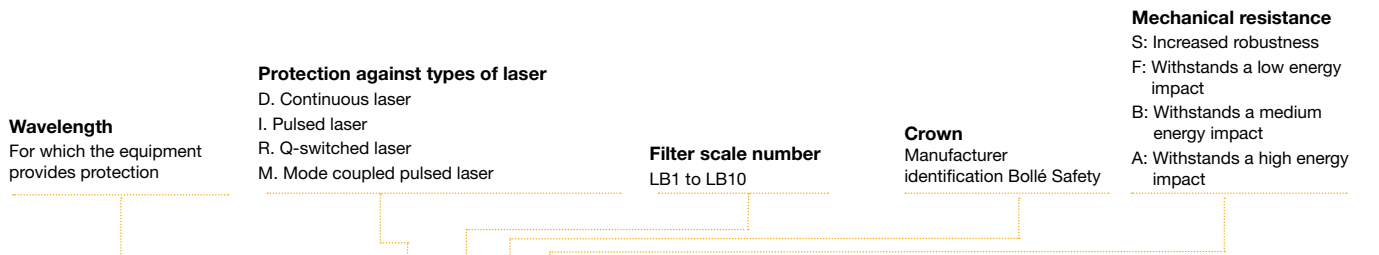
MARKING AND PROTECTION

Identify and understand the markings on goggles



MARKING AND PROTECTION

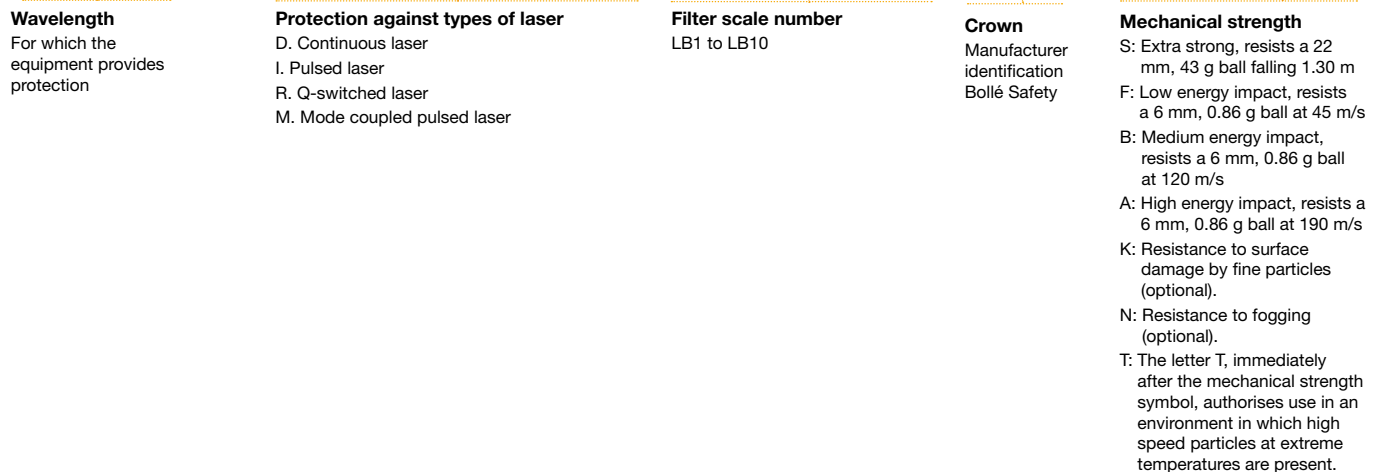
Identify and understand the markings on laser goggles



>830-930 DIR LB2  B  European standard

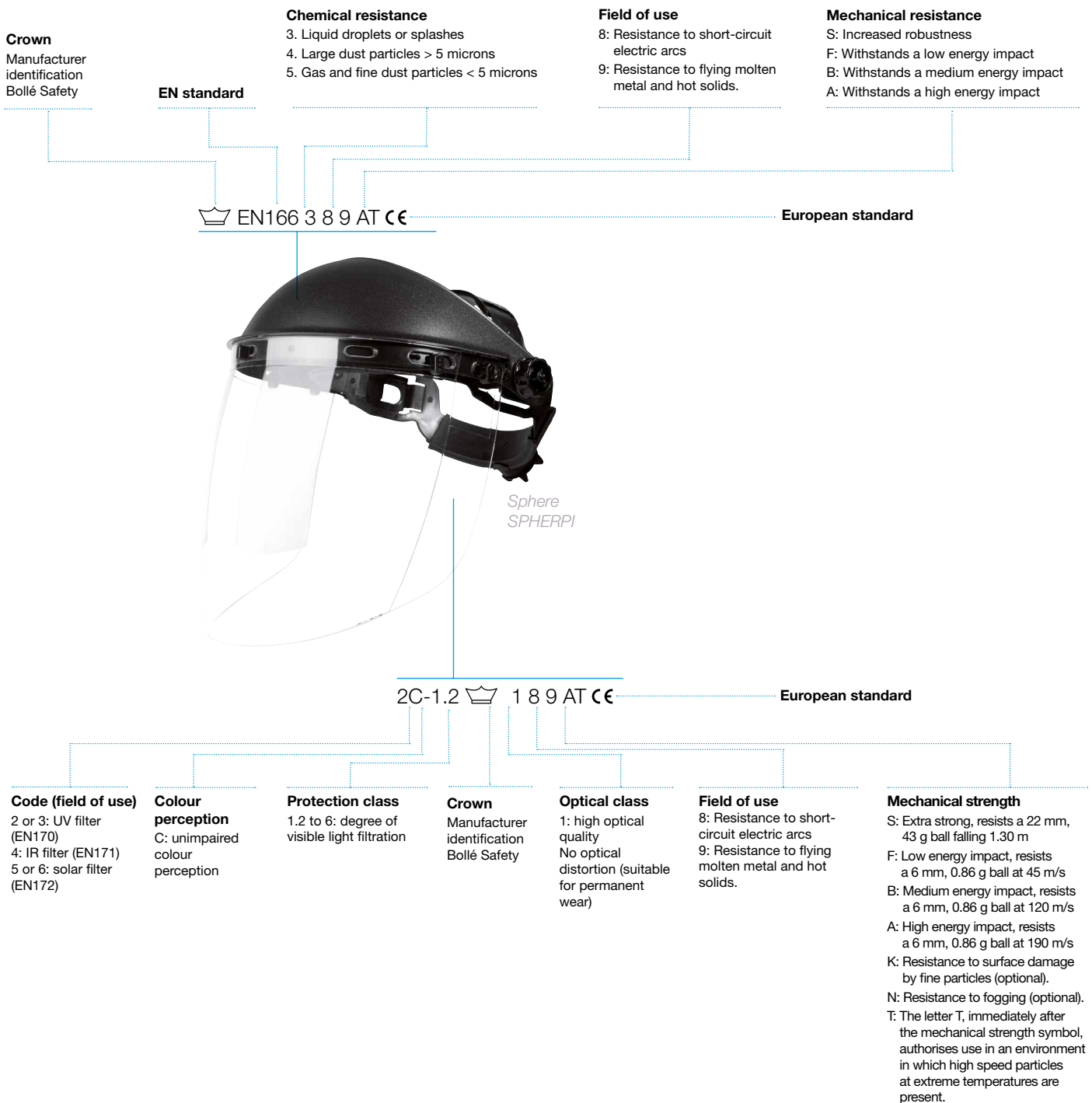


>830-930 DIR LB2  B  European standard



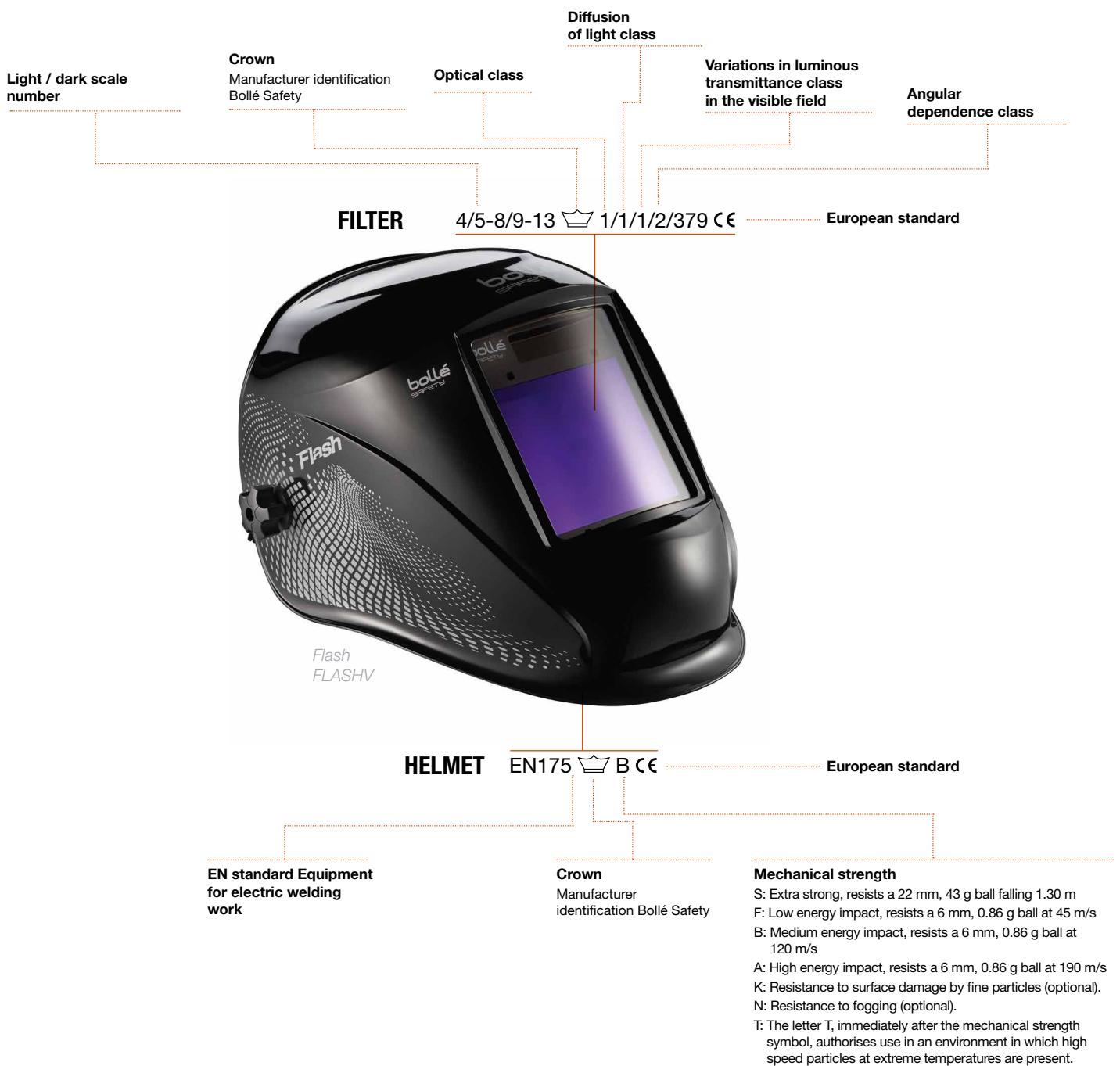
MARKING AND PROTECTION

Identify and understand the markings on face shields



MARKING AND PROTECTION


Identify and understand the markings on welding helmets




SUMMARY

MARKING & RISKS

LENS

Radiation / filter	Code and scale number	Identification of the manufacturer	Optical quality	Resistance to impacts	Resistance to extreme temperatures	Thermal resistance	Resistance to electric arcs	Resistance to immersion in water	European standard
2 - Ultraviolet	1.2 to 5		1 - Perfect optical quality / constant use 2- Intermittent use 3- Occasional work, but must not be worn continuously	S: Increased robustness F: Withstands a low energy impact B: Withstands a medium energy impact A: Withstands a high energy impact	T	9	8	W	CE
2C - Ultraviolet with good colour recognition									
4 - Infrared									
5 - Solar filter									
6 - Solar + infrared filter									
Single figure: welding filter									

FRAME

	Identification of the manufacturer	Standard	Resistance to chemical splashes	Thermal resistance	Resistance to electric arcs	Resistance to impacts	Resistance to extreme temperatures	European standard
No indications		EN166: common to all equipment EN169: Gas welding radiation EN175: Electric welding work EN379: Welding helmets and goggles EN170: UV radiation EN171: IR radiation EN172: Solar radiation EN207 & EN208: Laser radiation	3. Liquid droplets or splashes 4. Large dust particles > 5 microns 5. Gas and fine dust particles < 5 microns	9	8	S: Increased robustness F: Withstands a low energy impact B: Withstands a medium energy impact A: Withstands a high energy impact	T	CE

PREVENTION

//07

POPULAR MISCONCEPTIONS

MAINTENANCE

VISION

PRESCRIPTION LENSES

POPULAR MISCONCEPTIONS ABOUT EYE PROTECTION

Safety spectacles distort your vision!

FALSE

Our spectacles are optical quality 1 as defined by standard EN166. Beyond our ISO9001 certified process, Bollé Safety attaches great importance to the quality of manufacture of our products and to our brand image. However, some of the curved models may be uncomfortable for certain users. This is usually due to an emerging or as yet undetected visual defect. The wearer should therefore request an eye test.

The equipment is not compatible with the tasks the workers are required to perform!

**FALSE /
TRUE...**

When choosing the frame and also the lenses, it is important for the wearer to state their job in order to assess the risks linked to the work carried out. They can then be allocated a product corresponding to their needs. For example, for chemical risks, the CR39 is the most suitable product, unlike polycarbonate which is better for mechanical risks.

Safety spectacles give you a headache!

FALSE

Take care that there are no reflections and that the spectacles are not in poor condition (scratches, dirt, traces of oil, etc.) which may indeed impair vision.

- You are strongly advised to change the spectacles if they are damaged, and clean them carefully on a regular basis if necessary.
- If the problem persists, the wearer should be re-assessed: eye test, anti-reflection coating to improve comfort and reduce eye strain, etc.
- A period of adaptation is necessary for prescription spectacles with progressive lenses: Maximum 3 weeks.

POPULAR MISCONCEPTIONS ABOUT EYE PROTECTION

Eye protection doesn't look good!

FALSE

Manufacturers offer products combining technology, comfort, protection and an attractive look. The frames have a more attractive design which encourages users to wear them. Coloured models such as the red B808 spectacles are available. Products such as Iri-s also fit the shape of the face better, making them more comfortable.

Safety spectacles are uncomfortable!

**FALSE /
TRUE...**

You need to take time to choose the right frame. Safety equipment today is designed to improve the wearer's comfort (e.g. two sizes available for some models)

Of course, wearing safety spectacles is slightly restrictive but the effort made by Bollé Safety to innovate in terms of comfort, design and coatings provides numerous solutions.

Before making your final choice, you should allow a trial period for the staff to try out the protection and assess if wearing the PPE causes any discomfort, restriction or difficulty.

Eye protection must be worn all the time!

**FALSE /
TRUE...**

Some companies require their employees to wear the protection all day. It is vital to wear PPE to reduce work-related accidents throughout the establishment. The company is responsible for any accident which occurs on its premises.

Eye accidents don't only happen to other people and they often occur in places and conditions where you least expect them!

MAINTENANCE IS IMPORTANT!



1 CLEAN

The spectacles can be **cleaned with soap and water** then dried with a soft cloth to avoid scratches. However, **cleaning products** are available to clean more effectively.



2 PUT THEM AWAY

To avoid damaging spectacles or face shields, they must be **put away in a specific place** intended for this purpose after use.



3 REPLACE

Spectacles or face shields which are **scratched** or **whose frame is damaged must be replaced**.

THE RIGHT PROTECTION

HOW WE SEE

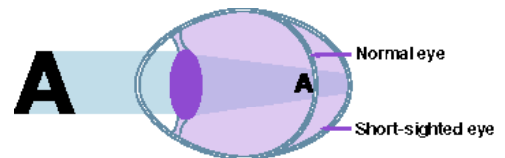
Vision begins when light rays enter the eye through the cornea, the first transparent tissue. Then, the rays pass through the pupil whose size varies according to the quantity of light that enters the eye.

The light rays then pass through the crystalline lens, which, by changing its shape, focuses the light rays on the retina. The information then travels to the brain via the optic nerve, for interpretation.

Myopia

(short-sightedness):

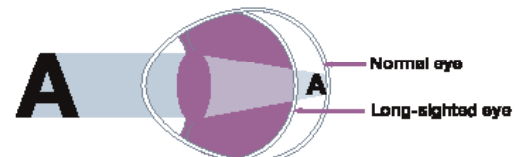
Short-sighted people can see close up but objects at a distance are blurred. This is because the image perceived by the eye is no longer projected perfectly on the retina but in front of it.



Hypermetropia

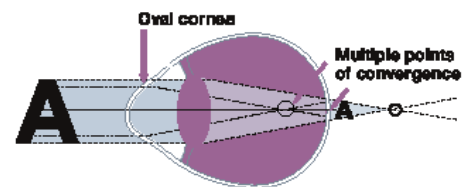
(long-sightedness):

Long-sighted people can see objects at a distance but those close up are blurred. This is because the image perceived by the eye is no longer projected perfectly on the retina but behind it.



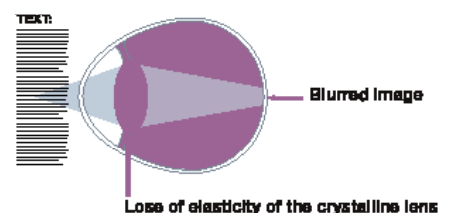
Astigmatism:

People with astigmatism have distorted vision at all distances. This condition is due to an abnormal curve of the cornea and/or crystalline lens.



Presbyopia:

People with presbyopia have blurred near vision (for reading in particular) as, with time, the crystalline lens loses its elasticity and its ability to focus on images perceived.





THE RIGHT PROTECTION

TYPES OF CORRECTIVE LENS

Single vision lenses:

Called single vision, these lenses feature one correction for a given distance: myopia, hypermetropia and/or astigmatism. They are known as single vision because the optical power is the same for the entire lens.

Progressive or varifocal lenses:

Varifocal lenses do not have any visible lines so they are more aesthetically appealing. The power gradually changes from the top to the bottom of the lens. It makes it possible to focus on objects at variable distances whereas a bifocal lens only allows clear vision at two given distances.

Free Form lenses:

Available on a wide range of lenses, Digital Free Form technology guarantees the highest level of visual performance with outstanding style. It results from an improved inner part of the lens with a significantly larger field of vision.

Degressive lenses:

The purpose of degressive lenses is first to correct near vision, then intermediate vision with decreasing power towards the top of the lens. Four fixed degressions are possible from 0.75, 1.25, 1.75 or 2.25 dioptré depending on the needs.

Bifocal lenses:

Bifocal lenses are designed for people who require two corrections, one for distance and for near vision. The upper part of the lens corrects distance vision and the lower area corrects near vision.



HE DID NOT SEE THE INTEREST IN PROTECTION. TODAY HE DOESN'T SEE ANYMORE.

David, 42, brick layer, totally disabled.



Photo: Getty Images

Because a single accident can cripple you for life, for over 120 years, Bollé Safety has been committed to offer maximum eye protection for every professional risk.

Not to wear glasses, is to ignore these risks and endanger the health of your eyes. Protect yourself today...with Bollé Safety!

bolle-safety.com

bolle
SAFETY