

The logo features the word "CONTEGO" in a large, bold, red, sans-serif font. Below it, the words "Safety Solutions" are written in a smaller, white, sans-serif font. The background is black with two large, curved, red shapes that resemble the segments of a protective eyewear lens.

CONTEGO

Safety Solutions

**The Contego Guide to
Protective Eyewear**

Introduction

Eyes are vulnerable to a range of risks in the workplace. They must be protected against mechanical, chemical, radiation and risks relating to laser light.

The failure to provide safety glasses or the appropriate type of vision protection can lead to a range of injuries, from minor ailments to partial and full blindness, and have severe legal and reputational consequences for employers. Therefore, it is essential that your employees are provided with the right safety eyewear.

There is a wide range of safety eyewear available for a variety of applications.

The use of these safety glasses and safety goggles is governed by a number of industry safety standards. This guide provides an explanation of these standards and the performance you can expect from the safety eyewear tested to these standards. It also explains the codes used to convey this information.

Overall, this guide is designed to allow you to make an informed decision about the protective eyewear you need to provide for your employees for the tasks that they undertake.

The role of risk assessments in selecting the right safety eyewear

When you are purchasing safety glasses and safety goggles for your workforce, it is recommended that you refer to a recent risk assessment of the workplace environments in which your employees are working. If a risk assessment does not exist, one should be carried out.

Taking this step provides a clear understanding of the hazards that the safety eyewear that you choose should protect against. This is particularly important for safety eyewear because workplace risks are not always immediately visible.

Carrying out a risk assessment will allow you to select the appropriate protective eyewear and will ensure that you comply with all the relevant health and safety rules and other industry regulations.

Workplace hazards relating to safety eyewear include:

- **Mechanical:** Flying debris, dust or molten metal
- **Chemical:** Fumes, gases or liquid splash
- **Radiation:** Heat (infrared), ultraviolet light or glare
- **Laser light:** Over a wide spectrum of wavelengths, from ultraviolet to infrared

An overview of safety glasses and other protective eyewear

There are four categories of workplace protective eyewear:

- Safety glasses: This protective eyewear should be comfortable to wear and come in a range of styles, including models available with prescription lenses
- Safety goggles: Protective goggles provide protection against all types of hazards. Some designs can be worn over regular spectacles.
- Safety face shields/visors: This visor protection protects the face and eyes, but it does not keep out dust or gas. It should be comfortable to wear for prolonged periods
- Safety sunglasses: With extra-thick frames, this protective eyewear protects the eyes from ultraviolet rays and the glare of the sun, as well as from flying debris

Key industry standards relating to safety eyewear

The main industry standard relating to the use of protective eyewear in the workplace is EN 166:2002. All safety glasses and goggles and vision protection must be certified to this standard to be categorised as such.

Supplementary to EN 166:2002 are EN 167:2002 and EN 168:2002, which detail the principal criteria against which EN 166 protective eyewear must be tested. EN 167:2002 concerns optical testing and EN 168:2002 details non-optical testing requirements.

| Standard | Description |
|-------------|----------------------------------------------------------------------------------------|
| EN 166:2002 | The main industry standard relating to protective eyewear in the workplace |
| EN 167:2002 | The industry standard relating to optical testing for workplace protective eyewear |
| EN 168:2002 | The industry standard relating to non-optical testing for workplace protective eyewear |

There are also a number of secondary industry standards relating to types of protective eyewear and to types of workplace use. These are:

| Standard | Description |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| EN 169:2002 | The industry standard relating to protective eyewear filters for welding and related techniques (transmittance requirements and recommended use) |
| EN 170:2002 | The industry standard relating to protective eyewear ultraviolet filters (transmittance requirements and recommended use) |
| EN 171:2002 | The industry standard relating to protective eyewear infrared filters (transmittance requirements and recommended use) |
| EN 172:1995 | The industry standard relating to protective eyewear solar radiation filters (transmittance requirements and recommended use) |
| EN 175:1997 | The industry standard relating to protective eyewear filters for welding and related techniques (transmittance requirements and recommended use) |
| EN 379:2003+A1:2009 | The industry standard relating to protective eyewear ultraviolet filters (transmittance requirements and recommended use) |
| EN 207:2017 | The industry standard relating to protective eyewear infrared filters (transmittance requirements and recommended use) |
| EN 208:2009 | The industry standard relating to protective eyewear solar radiation filters (transmittance requirements and recommended use) |
| EN 1731:2006 | The industry standard relating to protective eyewear solar radiation filters (transmittance requirements and recommended use) |

The basic safety eyewear standard: **EN 166:2002**

EN 166:2002 is the basic standard for safety eyewear. All protective eyewear that protects against hazards must conform to this standard.

EN 166:2002 includes a range of protective classifications. These relate to:

- Fields of use
- Optical class
- Mechanical strength
- Optional requirements

The information relating to these classifications is presented in a series of unique codes. Safety eyewear can carry more than one code. These codes are displayed on the lens and on the frame of the protective eyewear.

EN 167:2002 (optical testing for workplace protective eyewear)

Protective eyewear certified according to EN 167:2002 is tested for field of vision, transmission and diffusion, and refractive properties.

The main purpose of this optical testing is to make sure that the wearer's vision is not impeded or distorted by the protective eyewear and that the eyewear permits the entry of a sufficient amount of light.

In addition, exposure to ultraviolet light is tested, with results having to be within specific parameters. Testing of the material quality and surface of the protective eyewear is also carried out as part of EN 167:2002.

EN 168:2002 (non-optical testing for workplace protective eyewear)

Protective eyewear tested according to EN 168:2002 is tested for robustness and resistance to heat, ignition and corrosion. The eyewear undergoes specific testing in each of these three areas.

Additional notes on **EN 169**, **EN 170** and **EN 172** -certified safety eyewear

EN 169:2002 – protective eyewear filters for welding and related techniques

EN 169:2002-certified safety glasses are designed to protect wearers during:

- Light flame cutting
- Hard soldering
- Welding
- Arc gouging
- Plasma cutting

EN 170:2002 – protective eyewear ultraviolet filters

EN 170:2002-certified safety glasses are not suitable for looking at electrical arcs, directly or indirectly.

EN 172:1995 – protective eyewear infrared filters

Depending on the type of workplace use, **EN 172:1995**-certified safety eyewear can be used either as filters in safety glasses or as individual filters.

Safety eyewear classifications and code

The following is a description of EN 166:2002-certified protective eyewear classifications and their codes. The codes are displayed both on the lens and the frame, and the information presented in these areas can differ.

Examples of how and where protective eyewear codes are presented on a lens and a frame are included below.

Classifications and codes relating to fields of use.

| Field of use | Code | Description |
|-----------------------------|---------|------------------------------------------------------------------------------------|
| General use | No code | Non-specific mechanical risks, risks as a result of ultraviolet and infrared light |
| Liquids | 3 | Liquid droplets or splashes |
| Large dust particles | 4 | Particle size <5µm |
| Gas and fine dust particles | 5 | Smoke/dust with particle size <5µm |
| Short circuit electric arc | 8 | Electric arc as a result of short circuit in electrical equipment |
| Molten metal and hot solids | 9 | Splashes of molten metal and penetration of hot solids |

Classification and codes relating to mechanical strength

| Mechanical strength | Code | Description |
|--------------------------------|---------|---------------------------------------------------------------------|
| No mechanical strength | No code | Filters only |
| Increased strength | S | Safety eyewear with reinforced mineral lenses |
| Low-energy impact | F | 45m/s – safety face shields, safety goggles and safety glasses |
| Medium-energy impact | B | 120m/s – safety face shields and safety goggles |
| High-energy impact | A | 190m/s – polycarbonate face shields |
| Tested at extreme temperatures | T | Resistant to high-speed particles at temperatures from -5°C to 55°C |

Classification and codes relating to optical class

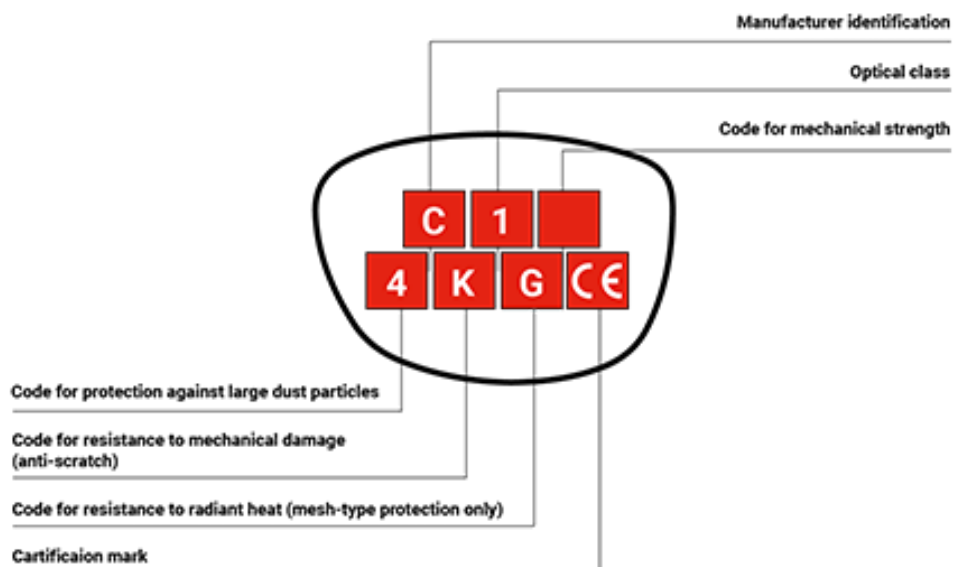
| Optical class | Code | Description |
|------------------------|------|-----------------------------------------------------------------------------------|
| High optical quality | 1 | Can be worn at all times (refractive power of ± 0.06 dioptries) |
| Medium optical quality | 2 | Should only be worn for occasional use (refractive power of ± 0.12 dioptries) |
| Low optical quality | 3 | Should not be worn for long periods (refractive power of ± 0.25 dioptries) |

Classification and codes relating to optional requirements

| Optional requirements | Code | Description |
|-----------------------|------|-------------------------------------------------|
| Hard coating | K | Resistance to mechanical damage (anti-scratch) |
| Non-mist | N | Resistance to misting/fogging |
| Enhanced reflection | R | Gold-coated safety face shields |
| Radiant heat | G | Mesh-type protection only |
| Non-standard fit | H | Protective eyewear designed to fit a small head |

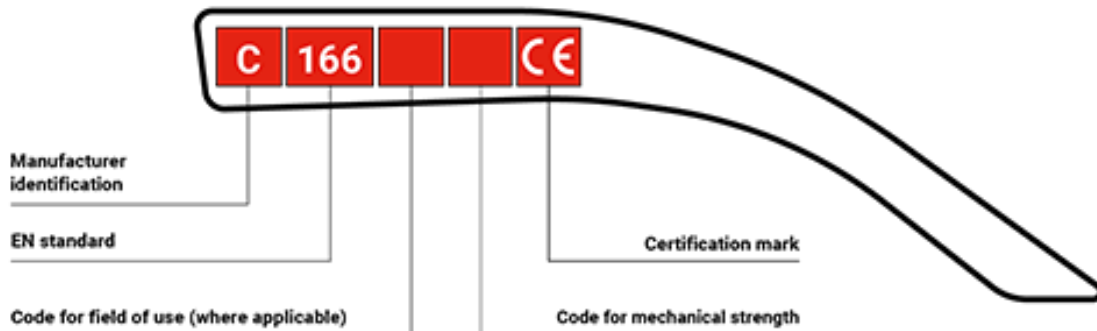
Example of EN 166:2002 codes on a lens

Example of protective eyewear lens markings



Example of EN 166:2002 codes on a frame

Example of protective eyewear frame markings



Choosing the right protective eyewear lens material

When choosing protective eyewear for your employees, lens material can be an important consideration and it is critical that the safety glasses or safety goggles have the right type of lens material. There are three main lens materials to consider:

- **CR39 plastic.** This material is extremely lightweight and has increased strength resistance, good chemical resistance and resistance to hot metal particulates
- **Polycarbonate.** This material is thinner than most other lens types and is extremely lightweight. It has low-energy impact resistance (F) and a hard coating that provides superior scratch resistance and absorbs ultraviolet light
- **Toughened glass.** This material is heavier than most other lens types, has increased strength impact resistance (S) and offers slightly greater resistance to abrasion

Choosing the right protective eyewear lens shade

When choosing protective eyewear for your employees, lens shade can be an important consideration and it is critical that the safety glasses and safety goggles have the right type of lens shade.

Protective eyewear lens shade is categorised as follows:

| Lens shade number | Eyewear application | Lens colour |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.2 to 16 | <ul style="list-style-type: none"> - Welder's assistant (shade 1.7) - Braze welding unit (shade 3 to 5) - Oxy cutting (shade 5 to 7) - Arc welding (shades greater than 7 require a face shield) | - Infrared shades 1.7 and 3.5 |
| 1.2 to 5 | <ul style="list-style-type: none"> - Welding (short circuit) - Electric arc - Sunlight | <ul style="list-style-type: none"> - Clear - Amber - Blue - High-definition lens yellow |
| 1.2 to 10 | <ul style="list-style-type: none"> - Arc welding - Glass manufacturing - Foundry work - Sunlight | <ul style="list-style-type: none"> - Infrared shades 1.7 and 3.5 - Blue cobalt |
| 1.1 to 1.4 | <ul style="list-style-type: none"> - High-intensity solar glare - Outdoor work | <ul style="list-style-type: none"> - Indoor/outdoor silver - Traffic signal recognition grey - Spectrum control technology 400 - Cappuccino - Blue mirror - Silver mirror |

How to choose the appropriate safety eyewear for your employees

The information contained in this safety eyewear guide is designed to help you choose the right safety glasses and goggles when placing an order for your workforce.

Different tasks require different safety glasses and goggles and it is important that your employees are provided with the appropriate personal protective equipment. You should always base your choice of protective eyewear on the most severe hazard that your employees will face.

By using this information and taking these steps, you will ensure that your company is fully compliant with all the relevant industry standards and that your employees can do their jobs safely, efficiently and to the highest standard.

Looking for industry-certified safety eyewear?

The friendly and expert team at Contego Safety Solutions is always on hand to give advice on personal protective equipment and clothing. Contact us now on 0800 122 3323 or sales@contegosafety.co.uk to discuss your needs.

Check out our range today

<https://shop.contegosafety.co.uk/ppe/eye-protection/>