



Q&A FACT SHEET
PPE AND EYE PROTECTION
STANDARDS EXPLAINED

Information based on known standards and recommendations as of July 31, 2020



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DID YOU KNOW?

Over 2.6 million people in Australia are employed in the mining, construction, manufacturing, agriculture, forestry and fishing industries¹ and need protective eyewear due to the high risk of accidental eye injury. Around 30 per cent of these workers also need vision correction.

That's a whole lot of numbers and reasons why you need to understand the PPE and Eye Protection Standards, established to help minimise the risks of eye injuries in the workplace.



The Importance of PPE and Eye Protection Standards

There are many aspects involved in the design, development and sale of quality eye protectors in Australia and New Zealand, including a complex process of assessment and independent validation to ensure the highest quality standards are met.

This is essential because the Standards that Australian and New Zealand businesses adhere to are some of the toughest in the world. It's a fact that most organisations in these countries will not allow a safety eyewear product to be used on a work site unless it has been independently certified to the appropriate Standards. And while functionality and strength remain the primary consideration of eye protector manufacturers, styling and fit are also important to help ensure comfort and compliance.

The Eye Protection Standards that Australian and New Zealand businesses adhere to are some of the toughest in the world.

Why is eye protection important in the workplace?

Today's advances in eye protection design, as well as improved work health and safety regulations, have helped reduce work-related eye injuries. But with approximately 50,000 eye injuries per year in Australia, costing around \$60 million², we are still far from solving this problem.

The hidden cost of workplace eye injuries

- There are approximately **50,000** eye injuries per year in Australia, costing around \$60 million⁷.
- **40%** of workers suffering ocular trauma resulting in vision loss are unable to return to their job afterwards⁸.
- **8%** of all workplace injuries are eye injuries⁹.
- In **70%** of cases, the eye injury was caused by contact with equipment or moving objects.
- People with uncorrected or reduced vision are **60%** more likely to have an occupational injury⁶.
- Failure of employers to comply with Australian Work Safety Standards could result in a fine of **\$600,000, five (5) years imprisonment** or both¹⁰.



IMPORTANT FACTS ON WORKPLACE EYE SAFETY

90%

OF ALL EYE INJURIES
CAN BE PREVENTED³.

60%

OF ALL EYE INJURIES IN AUSTRALIA
OCCUR IN THE WORKPLACE⁴.

FRIDAY

IS THE MOST COMMON
WORK DAY FOR EYE
INJURIES TO HAPPEN⁵.

WORKERS AGED 40⁺

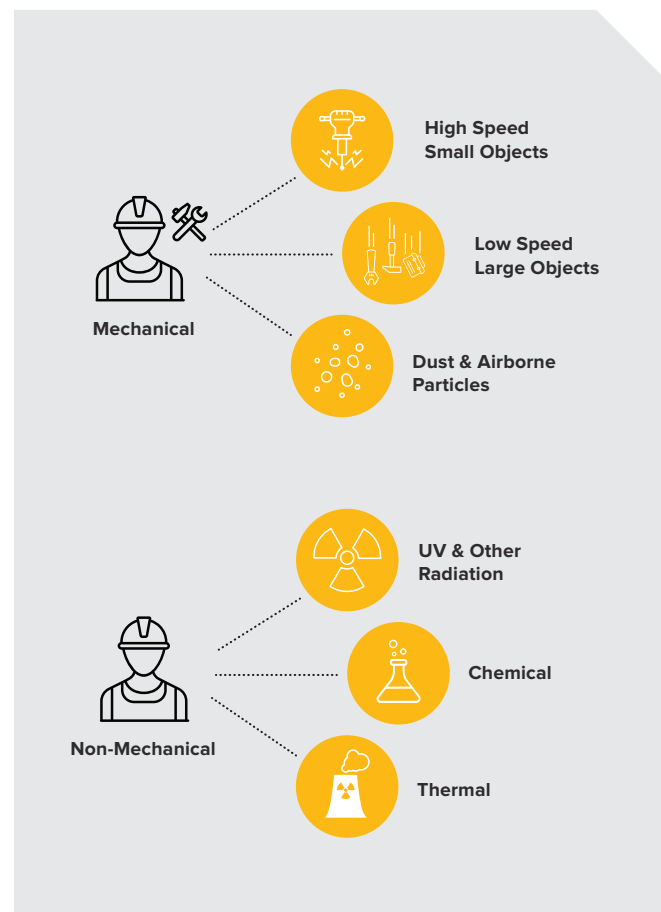
FACE INCREASED RISKS DUE TO
PRESBYOPIA⁶ AND OTHER AGE
RELATED EYE CONDITIONS.

Who's at risk?

Forestry, fishing, farming, construction and mining are among the industries often associated with eye injuries. Working with metal (for example, when hammering, grinding or cutting) is one of the most common sources of work-related eye injuries.

Other work hazards that frequently result in eye injuries include chemicals (acids, alkalis, e.g. cleaning solutions) and artificial radiation, for example, when welding (See Figure 1).

Figure 1: Common eye hazards



What are the Laws and Regulations Relating to PPE and Eye Protection

In Australia and New Zealand, strict guidelines control the safety of workers. Employers have a duty of care to protect their workers. The Australian Work Health and Safety Regulations (see below) apply to personal protective equipment (PPE), including eye protection, and are used to minimise risk to health and safety in a workplace.

Australian Work Health and Safety Regulations 2011 (excerpt)¹⁰

It is an employer’s duty to provide suitable protective clothing and equipment to employees.

“The person conducting a business or undertaking (PCBU) who directs the carrying out of work must provide the personal protective equipment to workers at the workplace, unless the personal protective equipment has been provided by another person conducting a business or undertaking.”

This applies if personal protective equipment is to be used to minimise a risk to health and safety in relation to work at a workplace.

Penalty in not complying

In the case of an individual	\$6,000
In the case of a body corporate	\$30,000
Penalty in the instance of death or serious injury:	
In the case of an individual	\$300,000 to \$600,000
or 5 years imprisonment	
or BOTH	
In the case of an offence committed by a body corporate	\$3,000,000

New Zealand Health and Safety at Work Act 2015 Summary (excerpt)¹¹

“The Health and Safety at Work Act 2015 (HSWA) requires PCBUs (persons conducting a business or undertaking) to take all reasonably practicable actions to eliminate or minimise risks to the health and safety of workers (and others that may be at risk from the work being done). This includes protecting people’s eyes.”

“You, the PCBU, must provide all necessary PPE (including eye protection) for your workers. You cannot pass the cost of providing eye protection to your workers or make them provide their own. Workers may choose to provide their own, but you must make sure it offers suitable protection. You must engage with your workers before you make decisions or propose changes that may affect their health or safety. This includes consulting with them about what types of eye protection to provide.”

What are the key requirements of the standard?

PSG Eyewear’s Founder, John Moore, was a firm believer in the importance of occupation-specific safety glasses. During his lifetime, he successfully campaigned for a Standard for prescription eye protection to be established, which led to the release of AS/NZ 1337.6 in April 2007. Key requirements for the Standard include the impact, coverage and optical performance of the complete prescription frame and lens. You can purchase a copy of the full Standard online through one of many suppliers by Googling: *Purchase AS/NZ 1337.6*.



What's the difference between certified and compliant safety eyewear?

Certified safety eyewear products have been independently tested to ensure they comply with Australian and New Zealand Standards and are your best guarantee of wearer protection. Compliant safety eyewear products are those that state compliance to a Standard but have no independent certification to prove this.

What does it mean if a product is compliant only?

Compliance to a voluntary or mandatory Standard is not enforced in Australia or New Zealand. Therefore, a manufacturer may declare compliance based on its testing procedures alone, and without independent testing or substantiation.

Compliance to a Standard is a statement that the product has met the Standard based on testing at one point in time. It is important to differentiate compliant from certified products and the potential limitations of a product which is compliant only, which may include:

- The eye protection may have only been tested once, and therefore has no allowance for potential manufacturing variances which can occur over time.
- A lack of testing procedure transparency.

What is certification?

Unlike compliance, certification is not open to interpretation. To achieve certification, the eye protection is tested by an independent certified laboratory and quality control processes reviewed and validated. Certified products are regularly tested for optical, transmittance and impact qualities with the manufacturing of frames, lenses and complete products audited periodically to ensure protective characteristics and quality are maintained.

How is safety eyewear assessed for certification?

When it comes to designing and manufacturing eyewear for safety, both the physical and optical qualities of the product are of vital importance. As you'd expect, the process of assessment and certification starts right at the beginning of the design phase when prototypes are assessed to ensure coverage is adequate for the required level of protection – for example, medium impact eye protectors require adequate lateral coverage.

Once the design has been reviewed and accepted, the first injection samples are manufactured and assessed for their compliance with Standards. Physical and optical assessments are also performed at this stage to ensure they meet the rigorous requirements for use.

Initial assessments for compliance are followed with ongoing batch testing of the eye protector's optical and physical properties to ensure it continues to meet the requirements of the Standard. This continued assessment helps guarantee that there is no variation in the quality or performance of the model throughout the manufacturing process.

Independent testing is conducted at an independent laboratory to prove compliance of the model before it is certified and can carry the Standards mark and a license number for traceability.

Additional quality and performance testing

When assessing prescription safety eyewear, in addition to testing for physical requirements, a range of powers representing the extremes are fully tested to determine their compliance with AS1337.6. Testing also includes determination of the specified optical power to ensure it is within tolerance of the requirements of AS/NZS 21987.

As with non-prescription eye protectors, ongoing batch testing is conducted of the lens and frame combinations to ensure quality and performance is consistently met.

Lens and frame markings

The lenses are marked with letters to indicate their appropriateness for different uses. For example, eye protectors with the appropriate level of impact protection, including lateral protection, can be sold as medium impact and are marked with an "I" or an "F" to indicate this to the wearer. All prescription eye protectors are date stamped and etched to indicate the level of protection they offer (see Table 1).



Protective Eyewear Design and Fitting

Why are protective eyewear lenses different?

Specialised lens designs can significantly help to heighten a worker's visual perception. Progressive lens designs, for example, that incorporate wider zones of optimum vision can make it easier for workers to operate effectively within a manufacturing environment where it is beneficial to combine sharp viewing in the far distance with absolute clarity for hazards which are closer to them. Similarly, on a mine site, an operator needs to be able to clearly view a hand-held instrument while also surveying potential hazards in the immediate area and at a distance.

Fortunately for today's workers, much of the knowledge stemming from research and development into eyewear for sport and lifestyle is being applied to the higher volume safety market. High base curve frame designs with gaskets now enable a large range of prescriptions as well as progressive lenses to be successfully fitted into eye protectors. The use of compensated lens designs that take into account parameters other than simply refraction, such as pantoscopic tilt and vertex distance, help ensure the prescribed power is the same as the 'as worn' power for the wearer.

Why are anti-fog frame designs and special lens coatings essential?

Fogging can lead to serious occupational health and safety issues in many industrial environments, especially in situations where critical visual judgments are made with heavy industrial equipment. Fogging can also impact production quality.

To counter these risks, quality eye protectors are now designed with effective ventilation and special lens coatings.

Anti-fog coatings and sprays have been developed to enhance fog resistance. To optimise their effectiveness, these coatings and sprays have limited life and need to be reapplied to maintain optimum visual acuity.

Can an optometrist fit impact-resistant lenses to a worker's normal frames or fit lenses to safety frames they've purchased?

Optometrists should not fit impact-resistant lenses to a worker's normal frames or fit lenses to safety frames they've purchased. This is because the frames and lenses of certified eye protection products work together to provide optimum protection and require specialist assessment and fitting depending on:

- the occupational hazards
- the worker's needs
- their environment.

Several eye protection options exist depending on the hazards (see Table 1) and the environment (see Table 2). For more detailed guidance, refer to the **Standard AS/NZS 1336**¹².

Table 1: Eye protection for common workplace hazards

Activities/Role	Suitable Eye Protection
Workers involved in machine cutting, grinding of metals where there are small particles at medium to high velocity	<ul style="list-style-type: none"> • Medium-impact eye protectors etched with an "I" or "F" • High-impact face shields, etched with a "V"
Horticulture, gardening, council workers are exposed to flying fragments at high velocity (e.g. when lawn mowing, using whipper snippers, edgers) with both user and spectators at risk	<ul style="list-style-type: none"> • Medium-impact eye protectors etched with an "I" or "F" • High-impact face shields, etched with a "V" • Tinted or outdoor untinted, etched with an "O"
Workers exposed to chemicals in a liquid or gas form (e.g. cleaning solutions incorporating alkali)	<ul style="list-style-type: none"> • Splash-resistant goggles, etched with a "C" • Face shields (used in addition to goggles)
Laser based surgical and cosmetic procedures where optical and thermal hazards exist (e.g. laser hair removal)	<ul style="list-style-type: none"> • Refer to AS 1337.4 and AS 1337.5
Workers exposed to non-ionising radiation (e.g. welding, furnace work)	<ul style="list-style-type: none"> • Refer to AS/NZS 1338.1 and AS NZS 1338.2 AS/NZS 1338.3



Table 2: Examples of environmental conditions and potential solutions

Environmental Condition & Concern	Solution
High humidity – Fogging	Antifog solution. If goggles are required, consider vented, indirect or direct to increase airflow.
Outdoor environments – UV damage, glare	Protection from UV is critical. UV protection is available from an ‘Outdoor’ untinted eye protector (marked with “O” on the lens) or ‘Category 3’ (marked with a “3” on the lens – this is the darkest tint category in AS/NZS 1337.1 ⁹) If glare is an issue, then ‘Category 3’ provides strong UV and glare protection. Keep in mind that the use of sunscreens can degrade both frame and lens materials if they come in contact.
High voltage work – (e.g. electricians working with conductive materials)	Non-conductive material and safety frames with no metal parts should be worn.
Moving from indoors to outdoors often – Changing light conditions	Photochromic or lightly tinted lenses (marked with a “1” on the lens – ‘Category 1’ is the lightest tint category).
Dust-eye irritation	Partial or full seal eye protection.
Chemicals – (eye hazard, potential to reduce performance of eye protection)	Certain chemicals (including when airborne) can degrade the performance of some plastics. Check with your safety eye protection supplier about any potential effect on eye protection performance.

Why is fit, comfort and coverage essential for safety eyewear?

If safety eye protection is not comfortable, it is less likely to be worn. When choosing safety eye protection, it is important to take into account the specific needs of workers, including different head shapes and sizes. This may include the need for smaller frames to suit workers with a smaller head width and different bridge widths (nasal contours) and sizes.

It is also essential to ensure full coverage of the eye area and minimise any gaps between the frame and face as much as possible. These factors will influence the ultimate fit, comfort and safety of workers, ensuring that the frames stay in place and that they provide adequate protection to the eye area. Safety frames providing adjustable nose pads, arm temple lengths and headbands or straps may also help optimise fit. It is important to pay close attention to any other PPE that needs to be worn, such as face masks, ensuring that their fit is compatible with the eye protection.

Can the wearer replace the lenses and keep the frames if their prescription changes?

It is important to consider prescription eye protection as a complete unit. Any change to the product may affect the performance and therefore, the capacity for them to protect the wearer. Any eye protectors procured from the supplier (PSG for instance), should be returned to PSG for review should the wearer’s prescription change.

PSG’s policy on the replacement of lenses in prescription safety glasses

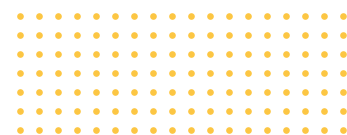
PSG does not replace lenses in prescription safety glasses. If there has been a change to the eyewear due to an impact or the wearer’s vision has changed, the entire pair of glasses needs to be changed. This is for two reasons:

1. PSG recommends the wearer looks to change their glasses every two years to account for normal wear and tear.
2. An impact event may compromise the protective capabilities of the glasses, and PSG does not compromise on safety.

An impact may compromise the protective capabilities of safety eyewear, making it essential to replace them.

(Note: As a manufacturer, PSG holds the Standards and Certification process literally. Some suppliers may have other opinions with respect to the replacement of lenses. By not replacing lenses only and replacing the glasses in full, PSG and the wearer have a greater level of certainty on the journey of the eyewear after the completion of the manufacturing process).

In the unlikely event that the wearer’s prescription changes within three months of the order/invoice date, PSG will remake the safety glasses with the updated prescription at no cost under a one-time-only goodwill policy. The customer must provide a printed or electronic copy of a current, non-expired prescription to PSG to validate this request.



Progressive lens non-adaptation*

Sometimes, wearers may encounter progressive lens non-adaptation. Subject to the following special conditions, PSG covers one pair of safety eyewear per customer only for non-adaptation:

- I. Customer must provide PSG with written notification of the difficulty of adaptation within a maximum period of ninety (90) days after the delivery date appearing on the safety eyewear delivery slip.
- II. Customer must provide PSG with all information reasonably necessary for analysis by the PSG of the difficulty of adaptation.
- III. Excluded from this warranty are bifocal, occupational or any other lens designs other than progressive lenses.
- IV. Excluded from this warranty are dispensing errors, changes to heights, pupillary distances (PDs), frame, fit parameters, lens treatment and prescription.

Can wearers remove their side shields if they don't like them?

Eye protection is certified as a complete product. Removing the side shields will void the certification and likely make the wearer's eye protection non-compliant. Most importantly, removing the eye shields will compromise the wearer's safety, especially if they are assessed as important for their occupational hazards and environment.

Is it possible to replace parts on protective eyewear?

Replacement parts are not provided for protective eyewear unless the safety eyewear is designed to have replaceable consumable parts, which include the following examples: nose pads and dust dam inserts. Spare parts can be purchased through PSG's Customer Service Team.



*Non-adaptation is the inability of the retina of the eye to adjust to various levels of light.

What are the Standards for Personal Eye Protection Equipment For Healthcare Workers?

Healthcare workers are potentially exposed to a range of biological hazards. Currently, there is no Standard that applies to eye protection specifically for biological hazards such as COVID-19 (see the section below).

To protect from potential spray and spurt from biological hazards, such as from a cough, sneeze and other exposures, a goggle or face shield are recommended. If the hazard is aerosolised, for example, during some medical procedures such as intubation, it is important to ensure an N95 mask, and sealed goggles are worn.

Given the limited coverage that they offer, especially from the side, prescription spectacles will not provide adequate protection for healthcare workers caring for COVID-19 patients.

COVID-19 personal eye protection equipment

As discussed previously, there is no specific Standard that applies to eye protection specifically for biological hazards such as COVID-19. However, as the primary method of COVID-19 infection is by droplet rather than airborne transmission*, closely fitted wraparound safety glasses that comply with the minimum coverage requirements for eye protectors, ANSI Z87.1 (impact rated, marked “Z87+”)¹³ or EN166 (increased robustness, marked “S”)¹⁴, AS/NZS 1337.1 (medium impact, marked “I” or “F”)¹⁵; could be used in circumstances when there is no aerosol generation¹⁶. Note:

The specification of an impact grade is because lateral protection is part of the impact requirement not because protection against impact is required in this circumstance.

Given the limited coverage that they offer, especially from the side, regular prescription spectacles will not provide adequate protection. In this case, the best option is to provide a face shield or goggles over the top of the prescription spectacles or goggles fitted with prescription lenses, taking care to ensure that the combination does not compromise fit and coverage.

What is the WHO’s PPE guidance for healthcare workers caring for COVID-19 patients?

The current guidance for PPE from the WHO¹⁷ has several categories depending on the level of risk. The focus is on contact and droplet precautions to prevent exposure of the nose, eyes and mouth. The PPE required, for example, during hospital care of COVID-19 patients includes gowns, gloves, medical masks and eye protection (goggles or face shield).

For aerosol-generating procedures specifically (for example, tracheal intubation, non-invasive ventilation, tracheostomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy), healthcare workers should also use an appropriately fitted P2/N95 respirator.

Where there is a shortage of PPE, all efforts should be made to minimise the risk of exposure using other methods. These measures include administrative, environmental and engineering controls, such as limiting paths of entry to clinics, installing physical barriers and the establishment of triage stations to screen patients outside the facility.

Using eye and face protection should be prioritised during procedures that generate splashes and sprays or when prolonged face-to-face proximity is unavoidable. The CDC and ECDC have included proposed strategies for further optimisation of eye protection that can be found on their websites^{16,18}.

For more information about COVID-19 Personal Protective Equipment (PPE) and Eye Protection Guidance, read the full article at <https://www.pointsdevue.com/article/covid-19-personal-protective-equipment-ppe-and-eye-protection-guidance>.

*As new information and evidence on transmission are discovered on a regular basis, you should follow and comply with the advice of National Health Advisories.

Summary of PPE and Eye Protection Standards

Category	Relevant Standard/s
Prescription safety eyewear	AS/NZS 1337.6
Non-prescription (plano) safety glasses	AS/NZS 1337.1
Safety goggles	AS/NZS 1337.1 category Medium
Safety eyewear with prescription inserts/adaptors	AS/NZS 1337.1 (NB: the standard does not cover RX inserts)
Face shields (for use in industry) face shields for welding	AS/NZS 1337.1, high impact category V or B AS/NZS 1338.1
UV eye protection (outdoor/road)	AS/NZS 1337.1 : Category O (outdoor untinted) or category 1-3 with adequate lateral protection
Laser eye protection	AS/NZS 1337.4 and 1337.5 (laser adjustment) guidance AS/NZS IEC 60825.1
Eye protection for welding	AS/NZS 1338.1
Artificial UV protection in eyewear (for example, curing lamps)	AS/NZS 1338.2
Infra-red eye protection	AS/NZS 1338.3
Medical/healthcare safety eyewear and face shields	No standard
Fire protection goggles	Goggles complying with AS/NZS 1337.1 with optional resistance to flame propagation and anti-fog requirements
Blue light eye protection	No standard
Recreational safety eyewear	Currently no Australian standards for sports eye protection
Sports and recreational safety eyewear	ASTM F803 safety standards for eye protectors for selected sports



About the Author

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Annette leads the Standardisation activities globally for Essilor. She also holds fellowships at the Save Sight Institute, The University of Sydney and The Lion's Eye Institute at the University of Western Australia. Her research focus is on eye injuries and their prevention.

She is an optometrist with extensive experience in product development, compliance, standardisation and quality control for prescription spectacles, sunglasses and eye protection.

About PSG – Prescription Safety Glasses Ltd

Established in 2006, PSG Eyewear is Australia and New Zealand's largest supplier of certified Prescription Safety Glasses under Standard AS/NZS 1337.6 and manufactured under the ISO 9001 QA system.

Supporting a wide network of local optical retailers, PSG is 100% focused on eye safety and protecting businesses from lost time due to injuries. Offering the largest range of frames and lenses in the Australian and New Zealand markets, PSG provides the highest level of eye protection and the best vision through its partnership with Essilor, the world's number one lens manufacturer.

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Prescription Safety Glasses

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