



Eye and Face Protection eTool

[Scope](#) [FAQ's](#) [Glossary](#) [Additional References](#) [Viewing/Printing Instructions](#) [Credits](#)

[Home](#) [PPE Selection](#) [OSHA Requirements](#) ● ● ●



Are you in danger of becoming a statistic?

Thousands of people are blinded each year from work-related eye injuries that could have been prevented with the proper selection and use of eye and face protection. Eye injuries alone cost more than \$300 million per year in lost production time, medical expenses, and worker compensation.



Are you wearing the proper protective equipment?

● ● [Selecting PPE for the workplace?](#)

What is your employer's responsibility in ensuring your safety?

● ● [OSHA Requirements](#)

Do not rely on personal protective equipment (PPE) devices alone to provide protection against hazards. Use PPE in conjunction with guards, engineering controls, and sound manufacturing practices

*eTools are "stand-alone", interactive, Web-based training tools specializing in occupational safety and health topics. They utilize graphical menus as well as expert system modules. These modules enable the user to answer questions, and receive reliable advice on how OSHA regulations apply to their work site. As indicated in the [disclaimer](#), eTools do not create new OSHA requirements.

[Home](#)	[Scope](#)	[FAQs](#)	[Glossary](#)	[Additional References](#)
[Viewing/Printing Instructions](#)	[Credits](#)	[PPE Selection](#)		
[OSHA requirements](#)	[Disclaimer](#)			



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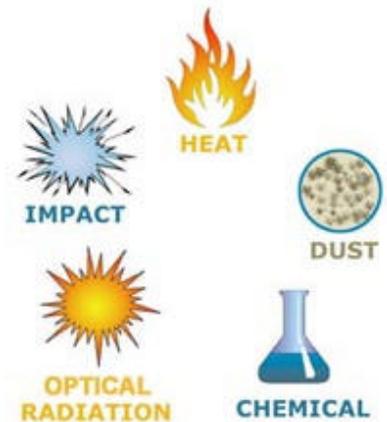
PPE Selection

- [Impact](#)
- [Heat](#)
- [Chemicals](#)
- [Dust](#)
- [Optical Radiation](#)

Selecting PPE for the Workplace

Personal protective equipment (PPE) for the eyes and face is designed to prevent or lessen the severity of injuries to workers. The employer must assess the workplace and determine if hazards that necessitate the use of eye and face protection are present or are likely to be present before assigning PPE to workers. [[1910.132 \(d\)](#)]

A hazard assessment should determine the risk of exposure to eye and face hazards, including those which may be encountered in an emergency. Employers should be aware of the possibility of multiple and simultaneous hazard exposures and be prepared to protect against the highest level of each hazard. [[1910 Subpart I App B](#)]



Hazard Assessment		
Hazard type	Examples of Hazard	Common Related Tasks
Impact	Flying objects such as large chips, fragments, particles, sand, and dirt.	Chipping, grinding, machining, masonry work, wood working, sawing, drilling, chiseling, powered fastening, riveting, and sanding.
Heat	Anything emitting extreme heat.	Furnace operations, pouring, casting, hot dipping, and welding.
Chemicals	Splash, fumes, vapors, and irritating mists.	Acid and chemical handling, degreasing, plating, and working with blood.
Dust	Harmful Dust.	Woodworking, buffing, and general dusty conditions.
Optical Radiation	Radiant energy, glare, and intense light	Welding, torch-cutting, brazing, soldering, and laser work.

[TOP](#)



Eye and Face Protection eTool

[Scope](#) | [FAQ's](#) | [Glossary](#)

[Additional References](#)

[Viewing/Printing Instructions](#)

[Credits](#)

[Home](#)

[PPE Selection](#)

[OSHA Requirements](#)



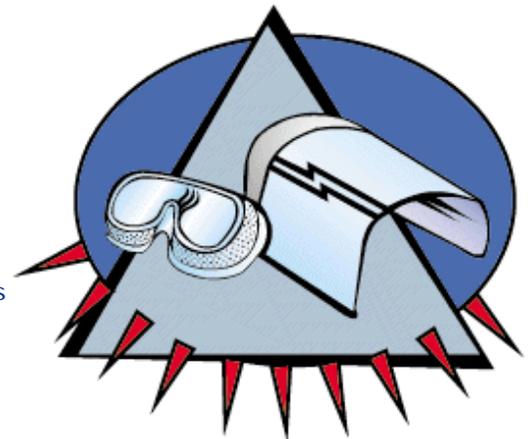
PPE Selection

- [Impact Hazards](#)
 - Spectacles
 - Goggles
 - Face Shields
- Heat
- Chemicals
- Dust
- Optical Radiation

PPE Selection: Impact Hazards

The majority of impact injuries result from flying or falling objects, or sparks striking the eye. Most of these objects are smaller than a pin head and can cause serious injury such as punctures, abrasions, and contusions.

While working in a hazardous area where the worker is exposed to flying objects, fragments, and particles, primary protective devices such as safety spectacles with side shields or goggles must be worn. Secondary protective devices such as face shields are required in conjunction with primary protective devices during severe exposure to impact hazards.



PPE Devices for Heat Hazards

<u>Spectacles</u>	Primary protectors intended to shield the eyes from a variety of heat hazards.
<u>Goggles</u>	Primary protectors intended to shield the eyes against liquid or chemical splash, irritating mists, vapors, and fumes.
<u>Face Shields</u>	Secondary protectors intended to protect the entire face against exposure to chemical hazards.

[TOP](#)

[Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) | [Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |



Eye and Face Protection eTool

Scope FAQ's Glossary

Additional
References

Viewing/Printing
Instructions

Credits

Home

PPE Selection

OSHA Requirements



PPE Selection

- Impact Hazards
 - Spectacles
 - Goggles
 - Face Shields
- Heat
- Chemicals
- Dust
- Optical Radiation

Impact Hazards: Safety Spectacles

Safety spectacles are intended to shield the wearer's eyes from impact hazards such as flying fragments, objects, large chips, and particles. Workers are required to use eye safety spectacles with side shields when there is a hazard from flying objects. Non-side shield spectacles are not acceptable eye protection for impact hazards. [\[1910.133\(a\)\(2\), 1915.153\(a\)\(2\)\]](#)

The frames of safety spectacles are constructed of metal and/or plastic and can be fitted with either corrective or plano impact-resistant lenses. Side shields may be incorporated into the frames of safety spectacles when needed. Consider each component of safety spectacles when selecting the appropriate device for your workplace.



- ✦ [Lenses](#)
- ✦ [Frames](#)
- ✦ [Side Shields](#)

Lenses

The lenses of safety spectacles are designed to resist moderate impact from flying objects and particles.

- ✦ Plano lenses:
 - ✦ Should be used by workers who do not require vision correction
 - ✦ May be flat or curved
 - ✦ Are available in clear, filtered, or tinted lenses
 - ✦ May include removable lenses
- ✦ Prescription (Rx) lenses:
 - ✦ Should be used by workers who require vision correction
 - ✦ May be clear, filtered, or tinted
 - ✦ May include removable lenses



Fig. 1:
Plano Lenses



Frames

The safety spectacle frames must fit comfortably and correctly to offer the necessary protection.

✦ Spatula temples:

- ✦ Fit *over* the ear
- ✦ Can be either fixed or adjustable
- ✦ Are available in metal or plastic



Fig. 3:
Spatula Temples

✦ Cable temples:

- ✦ Fit *around* the ear
- ✦ Can be either fixed or adjustable
- ✦ Are available in metal or plastic

✦ Headband temples:

- ✦ Are easily adjustable for a secure fit
- ✦ Are useful for tasks requiring movement



Fig. 4:
Headband Temples

✦ Bridges:

- ✦ Are available in a variety of sizes
- ✦ Are available in fixed or adjustable types
- ✦ May have adjustable nose pads with pliable arms



Fig. 5:
Adjustable Nose Pads

Side Shields

Side shields provide angular protection from impact hazards *in addition* to frontal protection.

✦ Flatfold or semi side shields:

- ✦ May be part of or attached to the temple
- ✦ Are permanent or removable
- ✦ Are solid or ventilated
- ✦ Are tinted or clear



**Fig. 6:
Flatfold Side Shields**

✍ Full (cup) side shields may be:

- ✍ Removable
- ✍ Wire screen
- ✍ Tinted or clear



**Fig. 7:
Full (cup) Side Shields**

TOP

[| Home](#) | [| Scope](#) | [| FAQs](#) | [| Glossary](#) | [| Additional References](#) |
[| Viewing/Printing Instructions](#) | [| Credits](#) | [| PPE Selection](#) | [| OSHA Requirements](#) |

 [Back to Top](#)

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Eye and Face Protection eTool

Scope FAQ's Glossary

Additional
References

Viewing/Printing
Instructions

Credits

Home

PPE Selection

OSHA Requirements



PPE Selection

• Impact Hazards

- Spectacles
- Goggles
- Face Shields

• Heat

• Chemicals

• Dust

• Optical Radiation

Impact Hazards: Safety Goggles

Safety goggles are intended to shield the wearer's eyes from impact hazards such as flying fragments, objects, large chips, and particles. Goggles fit the face immediately surrounding the eyes and form a protective seal around the eyes. This prevents objects from entering under or around the goggles.

Safety goggles may incorporate prescription lenses mounted behind protective lenses for individuals requiring vision correction. Take time to consider specific lens, frame, and ventilation options when selecting safety goggles.



- ✦ [Lenses](#)
- ✦ [Frames](#)
- ✦ [Ventilation](#)

Lenses

Safety goggles lenses are designed and tested to resist moderate impact.

- ✦ Clear lenses:
 - ✦ Are available with removable lenses
 - ✦ May incorporate prescription lenses
 - ✦ Do not provide special protection against optical radiation



Fig. 1:
Clear, Removable Lenses

TOP

Frames

Safety goggle frames must be properly fitted to the worker's face to form a protective seal around the eyes. Poorly fitted goggles will not offer the necessary protection.

- ✦ Eyecup safety goggles:
 - ✦ Cover the eye sockets completely

- ✦ Are available with direct or indirect ventilation
- ✦ May be rigid or flexible



Fig. 2: Eye Cup Goggles

✦ Cover safety goggles:

- ✦ May be worn over corrective spectacles without disturbing the adjustment of the spectacles
- ✦ Are available in direct, indirect, or non-ventilated types
- ✦ May be rigid or flexible



Fig. 3: Cover Goggles

Ventilation

Ventilated goggles allow air circulation while providing protection against airborne particles, dust, liquids, or light.

✦ Direct ventilation:

- ✦ Resist direct passage of large particles into the goggle
- ✦ Prevent fogging by allowing air circulation



Fig. 4: Direct-ventilated Goggles

✦ Indirect ventilation:

- ✦ Prevent fogging by allowing air circulation
- ✦ Protect against liquid or chemical splash entry



Fig. 5: Indirect-ventilated Goggles

✦ Non-ventilated goggles:

- ✦ Do not allow the passage of air into the goggle
- ✦ Prevent splash entry
- ✦ May fog and require frequent lens cleaning



Fig. 6: Non-ventilated goggles

[| Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) |
| [Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |

 [Back to Top](#)

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[Contact Us](#) | [Freedom of Information Act](#) | [Customer Survey](#)
[Privacy and Security Statement](#) | [Disclaimers](#)

Occupational Safety & Health Administration
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Washington, DC 20210



Eye and Face Protection eTool

[Scope](#) [FAQ's](#) [Glossary](#)

[Additional
References](#)

[Viewing/Printing
Instructions](#)

[Credits](#)

[Home](#)

[PPE Selection](#)

[OSHA Requirements](#)



PPE Selection

• Impact Hazards

- Spectacles

- Goggles

- **Face Shields**

• Heat

• Chemicals

• Dust

• Optical Radiation

Impact Hazards: Face Shields

Face shields are intended to protect the entire face or portions of it from impact hazards such as flying fragments, objects, large chips, and particles. When worn alone, face shields *do not* protect employees from impact hazards. Use face shields in combination with safety spectacles or goggles, even in the absence of dust or potential splashes, for additional protection beyond that offered by spectacles or goggles alone.

Face shield windows are made with different transparent materials and in varying degrees or levels of thickness. These levels should correspond with specific tasks. Window and headgear devices are available in various combinations to enable the worker to select the appropriate equipment:



- ✦ [Windows](#)
- ✦ [Headgear](#)

Windows

Face shield windows extend from the brow to below the chin and across the entire width of the face.

- ✦ Windows are available in both removable or lift-front designs:
 - ✦ Removable windows allow the replacement of damaged windows.
 - ✦ Lift-front windows may be raised, as needed, or left in the lowered position.
- ✦ Plastic windows:
 - ✦ Protect against light impact
 - ✦ May include a glass insert
 - ✦ Are available clear or filtered
- ✦ Wire-screen windows:
 - ✦ May include a plastic/glass insert
 - ✦ Protect against some moderate impact



**Figure 1:
Plastic Window**

- ⚡ Are not recommended for use involving chemical or liquid hazards



Figure 2:
Wire-Screen Window

▲ TOP

Headgear

Headgear supports the window shield and secures the device to the head.

⚡ Adjustable headgear:

- ⚡ Includes straps that allow the user to manipulate the size of the headgear to ensure a proper fit
- ⚡ Allows face shields to be shared between employees

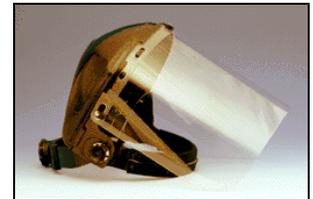


Figure 3:
Adjustable Headgear

⚡ Hard hats with face shields:

- ⚡ May have a window shield mounted under the visor of the hat
- ⚡ Include face shields that may be plastic, wire-screen, lift-front, or removable



Figure 4:
Hard Hat with Face Shield

▲ TOP

| [Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) |
| [Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |



Eye and Face Protection eTool

[Scope](#) | [FAQ's](#) | [Glossary](#)

[Additional References](#)

[Viewing/Printing Instructions](#)

[Credits](#)

[Home](#)

[PPE Selection](#)

[OSHA Requirements](#)



PPE Selection

- [Impact](#)
- [Heat](#)
- [Spectacles](#)
- [Goggles](#)
- [Face Shields](#)
- [Chemicals](#)
- [Dust](#)
- [Optical Radiation](#)

PPE Selection: Heat

Heat injuries may occur to the eye and face when workers are exposed to high temperatures, splashes of molten metal, or hot sparks. Protect your eyes from heat when workplace operations involve pouring, casting, hot dipping, furnace operations, and other similar activities. Burns to eye and face tissue are the main concern when working with heat hazards.



Working with heat hazards requires eye protection such as goggles or safety spectacles with special-purpose lenses and side shields. However, many heat hazard exposures require the use of a face shield *in addition* to safety spectacles or goggles. When selecting PPE, consider the source and intensity of the heat and the type of splashes that may occur in the workplace.

PPE Devices for Heat Hazards

<u>Spectacles</u>	Primary protectors intended to shield the eyes from a variety of heat hazards.
<u>Goggles</u>	Primary protectors intended to shield the eyes against liquid or chemical splash, irritating mists, vapors, and fumes.
<u>Face Shields</u>	Secondary protectors intended to protect the entire face against exposure to chemical hazards.

[TOP](#)

[Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) |
[Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |



Eye and Face Protection eTool

Scope FAQ's Glossary

Additional
References

Viewing/Printing
Instructions

Credits

Home

PPE Selection

OSHA Requirements



PPE Selection

- Impact Hazards
- Heat
 - Spectacles
 - Goggles
 - Face Shields
- Chemicals
- Dust
- Optical Radiation

Heat: Safety Spectacles

Safety spectacles with side shields are used as primary protection to shield the eyes from heat hazards. To adequately protect the eyes and face from high temperature exposure, use safety spectacles in combination with a heat-reflective face shield.

The frames of safety spectacles are constructed out of metal and/or plastic and can be fitted with either corrective or plano impact-resistant lenses. Side shields are incorporated into the frames of safety spectacles when workplace operations expose workers to angular impact hazards. Consider each component of safety spectacles when selecting the appropriate device for your workplace.



- ✦ [Lenses](#)
- ✦ [Frames](#)
- ✦ [Side Shields](#)

Lenses

The lenses of safety spectacles are designed to resist moderate impact from flying objects and particles.

- ✦ Plano lenses:
 - ✦ Should be used by workers who do not require vision correction
 - ✦ May be flat or curved
 - ✦ Are available in clear, filtered, or tinted lenses
 - ✦ May include removable lenses
- ✦ Prescription (Rx) lenses:
 - ✦ Should be used by workers who require vision correction
 - ✦ May be clear, filtered, or tinted
 - ✦ May include removable lenses



Fig. 1:
Plano Lenses



Fig. 2:
Prescription Lenses

- ✦ Filter Lenses:
 - ✦ Use various shades of filter lenses that protect against specific levels of optical

radiation

- ⌘ 1910.133(a)(5) -General Industry
- ⌘ 1915.153 (a)(4) -Maritime
- ⌘ 1926.102(b)(1) -Construction



Fig. 3:
Filter Lenses

⌘ Special Purpose Lenses:

- ⌘ Are used for visual tasks that require unusual filtering of light
- ⌘ Examples include but are not limited to:
 - ⌘ photochromic lenses
 - ⌘ didymium containing
 - ⌘ cobalt containing
 - ⌘ uniformly tinted
 - ⌘ prescription lenses
- ⌘ May not correspond to specific filter lens shades
- ⌘ May not provide adequate protection against ultraviolet and/or infrared radiation
- ⌘ May involve a lift-front device that is permanently attached or snaps-on and may be raised or lowered



Fig. 4:
Special Purpose Lenses

Frames

The safety spectacle frames must fit comfortably and correctly to offer the necessary protection.

⌘ Spatula temples:

- ⌘ Fit *over* the ear
- ⌘ Can be either fixed or adjustable
- ⌘ Are available in metal or plastic



Fig. 5:
Spatula Temples

⌘ Cable temples:

- ⌘ Fit *around* the ear
- ⌘ Can be either fixed or adjustable
- ⌘ Are available in metal or plastic

⌘ Headband temples:

- ⌘ Are easily adjustable for a secure fit
- ⌘ Are useful for tasks requiring movement



Fig. 6:
Headband Temples

⚡ Bridges:

- ⚡ Are available in a variety of sizes
- ⚡ Are available in fixed or adjustable types
- ⚡ May have adjustable nose pads with pliable arms



Fig. 7:
Adjustable Nose Pads

TOP

Side Shields

Side shields provide angular protection from impact hazards *in addition* to frontal protection.

⚡ Flatfold or semi side shields:

- ⚡ May be part of or attached to the temple
- ⚡ Are permanent or removable
- ⚡ Are solid or ventilated
- ⚡ Are tinted or clear



Fig. 8:
Flatfold Side Shields

⚡ Full (cup) side shields may be:

- ⚡ Removable
- ⚡ Wire screen
- ⚡ Tinted or clear



Fig. 9:
Full (cup) Side Shields

TOP

[Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) |
[Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |

 [Back to Top](#)

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Eye and Face Protection eTool

[Scope](#) [FAQ's](#) [Glossary](#)

[Additional References](#)

[Viewing/Printing Instructions](#)

[Credits](#)

[Home](#)

[PPE Selection](#)

[OSHA Requirements](#)



PPE Selection

- [Impact Hazards](#)
- [Heat](#)
 - [Spectacles](#)
 - [Goggles](#)
 - [Face Shields](#)
- [Chemicals](#)
- [Dust](#)
- [Optical Radiation](#)

Heat: Safety Goggles

Safety goggles are used as primary protection to shield the eyes from heat hazards. Goggles form a protective seal around the eyes, preventing objects or liquids from entering under or around the goggles. This is especially important when working with or around molten metals that may splash.

When employees are exposed to high temperatures, additional protection beyond that offered by primary protectors may be required. Use safety goggles in combination with a heat-reflective face shield for severe temperatures exposure. Consider specific lens, frame, and ventilation options when selecting safety goggles.



- ✦ [Lenses](#)
- ✦ [Frames](#)
- ✦ [Ventilation](#)

Lenses

Safety goggles lenses are designed and tested to resist moderate impact.

✦ Clear lenses:

- ✦ Are available with removable lenses
- ✦ May incorporate prescription lenses
- ✦ Do not provide special protection against optical radiation



Fig. 1:
Clear, Removable Lenses

✦ Filter lenses:

- ✦ Provide eye protection for performing tasks involving intense light.
- ✦ Available with removable lens types
- ✦ May incorporate prescription lenses
- ✦ Filter lens requirements



Fig. 2:
Filter Lenses

✦ Special purpose lenses:

- ✎ Are used for particular visual tasks that may include exposure to high temperatures
- ✎ May be photochromic
- ✎ May not correspond to specific filtered lens shades

TOP

Frames

Safety goggle frames must be properly fitted to the worker's face to form a protective seal around the eyes. Poorly fitted goggles will not offer the necessary protection.

- ✎ Eyecup safety goggles:
 - ✎ Cover the eye sockets completely
 - ✎ Are available with direct or indirect ventilation
 - ✎ May be rigid or flexible
- ✎ Cover safety goggles:
 - ✎ May be worn over corrective spectacles without disturbing the adjustment of the spectacles
 - ✎ Are available in direct, indirect, or non-ventilated types
 - ✎ May be rigid or flexible



Fig. 3: Eye Cup Goggles



Fig. 4: Cover Goggles

TOP

Ventilation

Ventilated goggles allow air circulation while providing protection against airborne particles, dust, liquids, or light.

- ✎ Direct ventilation:
 - ✎ Resist direct passage of large particles into the goggle
 - ✎ Prevent fogging by allowing air circulation
- ✎ Indirect ventilation:
 - ✎ Prevent fogging by allowing air circulation
 - ✎ Protect against liquid or chemical splash entry
- ✎ Non-ventilated goggles:
 - ✎ Do not allow the passage of air into the



Fig. 5:
Direct-ventilated Goggles



Fig. 6:
Indirect-ventilated Goggles

goggle

- ✗ Prevent splash entry
- ✗ May fog and require frequent lens cleaning

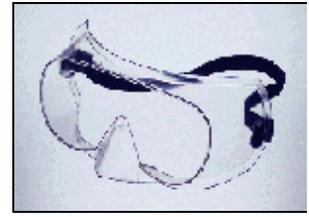


Fig. 7:
Non-ventilated goggles

TOP

[| Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) |
[| Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |

 [Back to Top](#)

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Eye and Face Protection eTool

[Scope](#) [FAQ's](#) [Glossary](#)

[Additional
References](#)

[Viewing/Printing
Instructions](#)

[Credits](#)

[Home](#)

[PPE Selection](#)

[OSHA Requirements](#)



PPE Selection

- [Impact Hazards](#)
- [Heat](#)
 - [Spectacles](#)
 - [Goggles](#)
 - [Face Shields](#)
- [Chemicals](#)
- [Dust](#)
- [Optical Radiation](#)

Heat: Face Shields

Heat-reflective and wire-screen face shields are intended to shield the entire face from a range of heat hazards. Specific hazards associated with heat include high temperatures, splash from molten metal, and hot sparks. Face shields are considered secondary protectors to be used *in addition* to primary protection such as safety spectacles or goggles.

Face shield windows are made with different transparent materials and in varying degrees or levels of thickness. The thickness of the face shield window should be matched to the task. Window and headgear devices come in various styles in order to enable the worker to select the appropriate equipment.



- ✦ [Windows](#)
- ✦ [Headgear](#)

Windows

Face shield windows extend from the brow to below the chin and across the entire width of the face.

- ✦ Windows are available in both removable or lift-front designs:
 - ✦ Removable windows allow the replacement of damaged windows.
 - ✦ Lift-front windows may be raised, as needed, or left in the lowered position.
- ✦ Wire-screen windows:
 - ✦ May include a plastic/glass insert
 - ✦ Protect against moderate impact
 - ✦ Not recommended for use involving chemical or liquid hazards



Figure 1:
Wire-Screen Window

- ✦ Heat-reflective windows:

- ✦ Offer limited UV protection
- ✦ Protect against impact
- ✦ Protect against radiant heat



**Figure 2:
Heat-Reflective
Window**

TOP

Headgear

Headgear supports the window shield and secures the device to the head.

✦ Adjustable headgear:

- ✦ Straps allow the user to manipulate the size of the headgear to ensure a proper fit
- ✦ Allows face shields to be shared between employees



**Figure 3:
Adjustable Headgear**

✦ Hard hats with face shields:

- ✦ A window shield may be mounted under the visor of the hat
- ✦ Face shields may be wire-screen, heat reflective, lift-front, or removable



**Figure 4:
Hard Hat with Face
Shield**

TOP

[Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) |
[Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |



Eye and Face Protection eTool

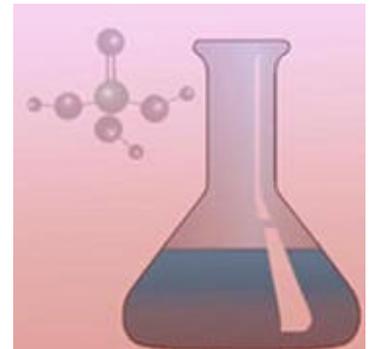


PPE Selection

- Impact
- Heat
- **Chemicals**
 - Goggles
 - Face Shields
- Dust
- Optical Radiation

PPE Selection: Chemicals

A large percentage of eye injuries are caused by direct contact with chemicals. These injuries often result from an inappropriate choice of PPE, that allows a chemical substance to enter from around or under protective eye equipment. Serious and irreversible damage can occur when chemical substances contact the eyes in the form of splash, mists, vapors, or fumes. When working with or around chemicals, it is important to know the location of emergency eyewash stations and how to access them with restricted vision.



When fitted and worn correctly, goggles protect your eyes from hazardous substances. A face shield may be required in areas where workers are exposed to severe chemical hazards.

PPE Devices for Chemical Hazards

<u>Goggles</u>	Primary protectors intended to shield the eyes against liquid or chemical splash, irritating mists, vapors, and fumes.
<u>Face Shields</u>	Secondary protectors intended to protect the entire face against exposure to chemical hazards.

▲ TOP



Eye and Face Protection eTool

[Scope](#) [FAQ's](#) [Glossary](#)

[Additional
References](#)

[Viewing/Printing
Instructions](#)

[Credits](#)

[Home](#)

[PPE Selection](#)

[OSHA Requirements](#)



PPE Selection

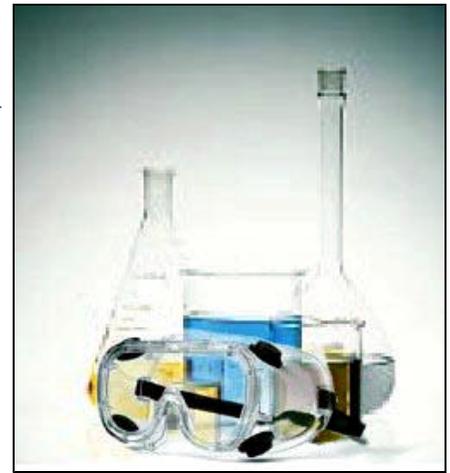
- [Impact](#)
- [Heat](#)
- [Chemicals](#)
 - [Goggles](#)
 - [Face Shields](#)
- [Dust](#)
- [Optical Radiation](#)

Chemicals: Goggles

Safety goggles protect the eyes, eye sockets, and the facial area immediately surrounding the eyes from a variety of chemical hazards. Goggles form a protective seal around the eyes, preventing objects or liquids from entering under or around the goggles. This is especially important when working with or around liquids that may splash, spray, or mist.

Safety goggles may incorporate prescription lenses mounted behind protective lenses for individuals requiring vision correction. Take time to consider specific lens, frame, and ventilation options when selecting safety goggles.

- ✎ [Lenses](#)
- ✎ [Frames](#)
- ✎ [Ventilation](#)



Lenses

Safety goggles lenses are designed and tested to resist moderate impact.

- ✎ Clear lenses:
 - ✎ Are available with removable lenses
 - ✎ May incorporate prescription lenses
 - ✎ Do not provide special protection against optical radiation



Fig. 1:
Clear, Removable Lenses

[TOP](#)

Frames

Safety goggle frames must be properly fitted to the worker's face to form a protective seal around the eyes. Poorly fitted goggles will not offer the necessary protection.

- ✦ Eyecup safety goggles:
 - ✦ Cover the eye sockets completely
 - ✦ Are available with direct or indirect ventilation
 - ✦ May be rigid or flexible



Fig. 2: Eye Cup Goggles

- ✦ Cover safety goggles:
 - ✦ May be worn over corrective spectacles without disturbing the adjustment of the spectacles
 - ✦ Are available in direct, indirect, or non-ventilated types
 - ✦ May be rigid or flexible



Fig. 3: Cover Goggles

Ventilation

Ventilated goggles allow air circulation while providing protection against airborne particles, dust, liquids, or light.

- ✦ Direct ventilation:
 - ✦ Resist direct passage of large particles into the goggle
 - ✦ Prevent fogging by allowing air circulation



Fig. 4: Direct-ventilated Goggles

- ✦ Indirect ventilation:
 - ✦ Prevent fogging by allowing air circulation
 - ✦ Protect against liquid or chemical splash entry



Fig. 5: Indirect-ventilated Goggles

- ✦ Non-ventilated goggles:
 - ✦ Do not allow the passage of air into the goggle
 - ✦ Prevent splash entry
 - ✦ May fog and require frequent lens cleaning

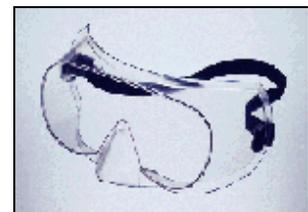


Fig. 6: Non-ventilated goggles



Eye and Face Protection eTool

[Scope](#) [FAQ's](#) [Glossary](#)

[Additional
References](#)

[Viewing/Printing
Instructions](#)

[Credits](#)

[Home](#)

[PPE Selection](#)

[OSHA Requirements](#)



PPE Selection

- [Impact](#)
- [Heat](#)
- [Chemicals](#)
 - [Goggles](#)
 - [Face Shields](#)
- [Dust](#)
- [Optical Radiation](#)

Chemicals: Face Shields

Face shields are intended to protect the entire face from a variety of chemical hazards. All face shields are considered secondary protection and must be used *in addition* to safety goggles to provide adequate protection.

Face shield windows are made with different transparent materials and in varying degrees or levels of thickness. These levels should be correspond with specific tasks. Window and headgear devices are available in various combinations in order to enable the worker to select the appropriate equipment:



- ✦ [Windows](#)
- ✦ [Headgear](#)

Windows

Face shield windows extend from the brow to below the chin and across the entire width of the face.

- ✦ Windows are available in both removable or lift-front designs:
 - ✦ Removable windows allow the replacement of damaged windows.
 - ✦ Lift-front windows may be raised, as needed, or left in the lowered position.
- ✦ Plastic windows:
 - ✦ Protect against light impact and splash
 - ✦ May include a glass insert
 - ✦ Available clear or filtered



Figure 1: Plastic Window

[TOP](#)

Headgear

Headgear supports the window shield and secures the device to the head.

⌘ Adjustable headgear:

- ⌘ Straps allow the user to manipulate the size of the headgear to ensure a proper fit
- ⌘ Allows face shields to be shared between employees

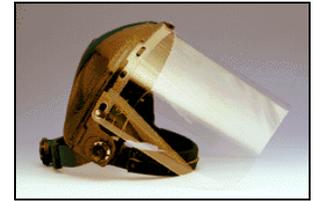


Figure 2:
Adjustable Headgear

⌘ Hard hats with face shields:

- ⌘ A window shield may be mounted under the visor of the hat
- ⌘ Face shields may be wire-screen, heat reflective, lift-front, or removable



Figure 3:
Hard Hat with Face Shield

▲ TOP

[Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) |
[Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |

 [Back to Top](#)

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Eye and Face Protection eTool

[Scope](#) | [FAQ's](#) | [Glossary](#)

[Additional References](#)

[Viewing/Printing Instructions](#)

[Credits](#)

[Home](#)

[PPE Selection](#)

[OSHA Requirements](#)



PPE Selection

- Impact
- Heat
- Chemicals
- **Dust**
 - Goggles
- Optical Radiation

PPE Selection: Dust

Dust is present in the workplace during operations such as woodworking and buffing. Working in a dusty environment can cause eye injuries and presents additional hazards to contact lens wearers.

Either eyecup or cover-type safety goggles should be worn when dust is present. Safety goggles are the only effective type of eye protection from nuisance dust because they create a protective seal around the eyes.



PPE Devices for Dust Hazards

Goggles

Primary protectors intended to protect the eyes against a variety of airborne particles and harmful dust.

[TOP](#)

[Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) | [Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |



Eye and Face Protection eTool

[Scope](#) [FAQ's](#) [Glossary](#)

[Additional
References](#)

[Viewing/Printing
Instructions](#)

[Credits](#)

[Home](#)

[PPE Selection](#)

[OSHA Requirements](#)



PPE Selection

- Impact
- Heat
- Chemicals
- **Dust**
 - **Goggles**
- Optical Radiation

Dust: Goggles

Safety goggles are intended to protect the eyes against dust hazards. Goggles form a protective seal around the eyes, preventing nuisance dust from entering under or around the goggles. Ventilation should be adequate, but well protected from dust entry.

Safety goggles may incorporate prescription lenses mounted behind protective lenses for individuals requiring vision correction. Take time to consider specific lens, frame, and ventilation options when selecting safety goggles



- ✦ [Lenses](#)
- ✦ [Frames](#)
- ✦ [Ventilation](#)

Lenses

Safety goggles lenses are designed and tested to resist moderate impact.

- ✦ Clear lenses:
 - ✦ Are available with removable lenses
 - ✦ May incorporate prescription lenses
 - ✦ Do not provide special protection against optical radiation



Fig. 1:
Clear, Removable Lenses

[TOP](#)

Frames

Safety goggle frames must be properly fitted to the worker's face to form a protective seal around the eyes. Poorly fitted goggles will not offer the necessary protection.

- ✦ Eyecup safety goggles:
 - ✦ Cover the eye sockets completely

- ⚡ Are available with direct or indirect ventilation
- ⚡ May be rigid or flexible



Fig. 2:
Eye Cup Goggles

⚡ Cover safety goggles:

- ⚡ May be worn over corrective spectacles without disturbing the adjustment of the spectacles
- ⚡ Are available in direct, indirect, or non-ventilated types
- ⚡ May be rigid or flexible



Fig. 3:
Cover Goggles

TOP

Ventilation

Ventilated goggles allow air circulation while providing protection against airborne particles, dust, liquids, or light.

⚡ Direct ventilation:

- ⚡ Resist direct passage of large particles into the goggle
- ⚡ Prevent fogging by allowing air circulation

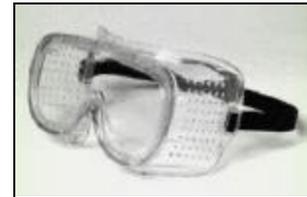


Fig. 4:
Direct-ventilated Goggles

⚡ Indirect ventilation:

- ⚡ Prevent fogging by allowing air circulation
- ⚡ Protect against liquid or chemical splash entry



Fig. 5:
Indirect-ventilated Goggles

⚡ Non-ventilated goggles:

- ⚡ Do not allow the passage of air into the goggle
- ⚡ Prevent splash entry
- ⚡ May fog and require frequent lens cleaning

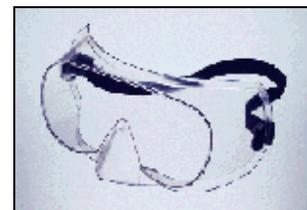


Fig. 6:
Non-ventilated goggles

TOP

 [Back to Top](#)

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[Privacy and Security Statement](#) | [Disclaimers](#)

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Washington, DC 20210



Eye and Face Protection eTool

Scope FAQ's Glossary

Additional
References

Viewing/Printing
Instructions

Credits

Home

PPE Selection

OSHA Requirements



PPE Selection

- Impact
- Heat
- Chemicals
- Dust
- **Optical Radiation**
 - Filter Lenses
 - Welding
 - Lasers
 - Glare

PPE Selection: Optical Radiation

Laser work and similar operations create intense concentrations of heat, ultraviolet, infrared, and reflected light radiation. A laser beam, of sufficient power, can produce intensities greater than those experienced when looking directly at the sun. Unprotected laser exposure may result in eye injuries including retinal burns, cataracts, and permanent blindness. When lasers produce invisible ultraviolet, or other radiation, both employees and visitors should use appropriate eye protection at all times.

Determine the maximum power density, or intensity, lasers produce when workers are exposed to laser beams. Based on this knowledge, select lenses that protect against the maximum intensity. The selection of laser protection should depend upon the lasers in use and the operating conditions. Workers with exposure to laser beams must be furnished suitable laser protection. [1926.102(b)(2)]



- ✦ [Lens Requirements](#)
- ✦ [Glare Protection](#)

Lens Requirements

When selecting filter lenses, begin with a shade too dark to see the welding zone. Then try lighter shades until one allows a sufficient view of the welding zone without going below the minimum protective shade.

- ✦ [1910.133\(a\)\(5\)](#) -General Industry
- ✦ [1915.153 \(a\)\(4\)](#) -Maritime
- ✦ [1926.102\(b\)\(1\)](#) -Construction

TOP

Glare Protection

Control Glare with:

- ✦ [Special-Purpose Spectacles](#) that include [filter](#) or special-purpose lenses to

provide protection against eye strain

- ✗ Changes in your work area or lighting
- ✗ Tinted eyeglass lenses or visor-type shade

 [TOP](#)

[| Home](#) | [| Scope](#) | [| FAQs](#) | [| Glossary](#) | [| Additional References](#) |
[| Viewing/Printing Instructions](#) | [| Credits](#) | [| PPE Selection](#) | [| OSHA Requirements](#) |

 [Back to Top](#)

www.osha.gov

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[Contact Us](#) | [Freedom of Information Act](#) | [Customer Survey](#)
[Privacy and Security Statement](#) | [Disclaimers](#)

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210



Eye and Face Protection eTool

Scope FAQ's Glossary

Additional
References

Viewing/Printing
Instructions

Credits

Home

PPE Selection

OSHA Requirements



PPE Selection

- Impact
- Heat
- Chemicals
- Dust
- **Optical Radiation**
 - Filter Lenses
 - **Welding**
 - Lasers
 - Glare

Optical Radiation: Welding Protection

The intensity of visible light and radiant energy produced by welding operations varies depending on the task, the electrode size, and the arc current. Workers involved in welding, cutting, and brazing operations must use appropriate welding protection depending on specific welding operations. [1926.102(a)(5)]

Only filter lenses with the appropriate shade number will provide protection against optical radiation. [Filter lenses](#) must coincide to specific radiant energy exposure.

Welding protectors are constructed of heat resistant material such as vulcanized fiber or fiberglass and fitted with a filtered lens to protect workers eyes from burns caused by infrared or other intense radiant energy. These devices protect the eyes and face from flying sparks, metal spatter, and slag chips produced during welding, brazing, soldering, and cutting.



Welding helmets are secondary protectors intended to shield the eyes and face from optical radiation, heat, and impact. Use welding helmets *in addition* to primary protection such as safety spectacles or goggles to provide adequate protection.

- ✎ [Windows and Shields](#)
- ✎ [Headgear](#)

Windows and Shields

Stationary windows:

- ✎ May include easily removable filter and cover plates
- ✎ Are available in many filter lens shades in order to provide appropriate protection



Figure 1:
Stationary Window

Lift-front windows:

- ✎ Include an adjustable feature, which allows the user to lift the window

- ✎ May include easily removable filter and cover plates
- ✎ Are available in many filter lens shades in order to provide appropriate protection



Figure 2:
Lift-front Window

Hand held shields:

- ✎ May be desired for certain welding operations that allow workers to hold their welding protection
- ✎ May include easily removable filter and cover plates
- ✎ Are available in many filter lens shades in order to provide appropriate protection



Figure 3:
Hand-held Shield

Welding goggles:

- ✎ Use filter lenses to protect the eyes from optical radiation
- ✎ Include an adjustable strap
- ✎ Do not provide face protection
- ✎ Available in eyecup or cover types



Figure 4:
Welding Goggles

▲ TOP

Headgear

Headgear:

- ✎ Supports the window and secures the the device to the worker's head.
- ✎ Welding helmets are heat and electricity insulated and flame resistant



Figure 5:
Headgear

▲ TOP

 [Back to Top](#)

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[Privacy and Security Statement](#) | [Disclaimers](#)

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210



Eye and Face Protection eTool

Scope FAQ's Glossary

Additional
References

Viewing/Printing
Instructions

Credits

Home

PPE Selection

OSHA Requirements



PPE Selection

- Impact
- Heat
- Chemicals
- Dust
- **Optical Radiation**
 - Filter Lenses
 - Welding
 - Lasers
 - Glare

Optical Radiation: Laser Protection

Laser work and similar operations create intense concentrations of heat, ultraviolet, infrared, and reflected light radiation. A laser beam, of sufficient power, can produce intensities greater than those experienced when looking directly at the sun. Unprotected laser exposure may result in eye injuries including retinal burns, cataracts, and permanent blindness. When lasers produce invisible ultraviolet, or other radiation, both employees and visitors should use appropriate eye protection at all times.



Determine the maximum power density, or intensity, lasers produce when workers are exposed to laser beams. Based on this knowledge, select lenses that protect against the maximum intensity. The selection of laser protection should depend upon the lasers in use and the operating conditions. Workers with exposure to laser beams must be furnished suitable laser protection. [1926.102(b)(2)]

- ✦ [Lens Requirements](#)
- ✦ [Selecting Laser Safety Glass](#)

Lens Requirements

Every pair of laser safety spectacles or goggles must bear a label with the following information:

- ✦ Windows are available in both removable or lift-front designs:
 - ✦ Removable windows allow the replacement of damaged windows.
 - ✦ Lift-front windows may be raised, as needed, or left in the lowered position.



Figure 1:
Laser Safety Lenses

Selecting Laser Safety Glass

The following table shows the maximum power or energy density for which adequate protection is afforded by safety goggles of optical densities from 5 through 8. [1926.102(b)(2)(i)]

Intensity, CW maximum power density [watts/cm(2)]	Attenuation	
	Optical Density (O.D.)	Attenuation Factor
10(-2)	5	10(5)
10(-1)	6	10(6)
1.0	7	10(7)
10.0	8	10(8)

When lasers emit radiation between two measures of power density (or light blocking capability) lenses must be provided that offer protection against the higher of the two intensities.

 TOP

[Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) |
[Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |

 [Back to Top](#)

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[Contact Us](#) | [Freedom of Information Act](#) | [Customer Survey](#)
[Privacy and Security Statement](#) | [Disclaimers](#)

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210



Eye and Face Protection eTool

Scope FAQ's Glossary

Additional
References

Viewing/Printing
Instructions

Credits

Home

PPE Selection

OSHA Requirements



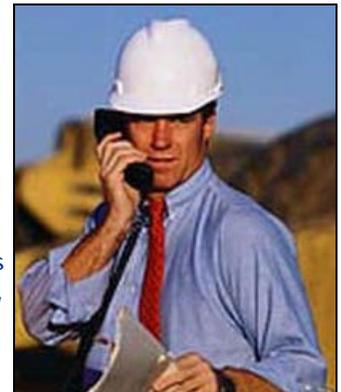
OSHA Requirements

- OSHA Standards
- Training
- PPE Criteria
- Fitting
- Maintenance
- Rx Lenses

OSHA Requirements

OSHA requires employers to ensure the safety of all employees in the work environment. Eye and face protection must be provided whenever necessary to protect against chemical, environmental, and radiological hazards or mechanical irritants.

Ensuring worker safety includes conducting a workplace hazard assessment and providing adequate training for all workers who require eye and face protection. When employees are trained to work safely, through the following requirements, they should be able to anticipate and avoid injury from job related hazards.



- ✦ [OSHA Standards](#)
- ✦ [Training and Qualification of Employees](#)
- ✦ [Criteria for PPE](#)
- ✦ [Fitting of PPE](#)
- ✦ [Maintenance and Care of PPE](#)
- ✦ [Contacts and Prescription \(Rx\) Lenses](#)

OSHA Standards

The following OSHA standards provide mandatory requirements and compliance assistance for employers when selecting proper eye and face protection:

- ✦ [1910.132](#) -General requirements
- ✦ [1910.133](#) -General Industry
- ✦ [1915.153](#) -Maritime
- ✦ [1926.102](#) -Construction

The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. To select PPE for the workplace, see the [Hazard Assessment](#) module.

Training and Qualification of Employees

Employers must provide training for each employee who is required to use PPE in the workplace. [1910.132(f)]

- ⌘ Each employee shall be trained to know at least the following:
 - ⌘ When PPE is necessary
 - ⌘ What PPE is necessary
 - ⌘ How to properly don, doff, adjust, and wear PPE
 - ⌘ Limitations of the PPE
 - ⌘ Proper care, maintenance, useful life, and disposal of the PPE
- ⌘ All training should be conducted by a knowledgeable designated person.
- ⌘ All required training should be presented in a manner that the employee can understand.
- ⌘ Each affected employee shall demonstrate an understanding of the training specified and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE.
- ⌘ Employers who allow their employees to wear eye and face protection on a voluntary basis when not required by OSHA or the employer must implement limited provisions of a PPE program. For all other voluntary users, an additional written eye and face protection program that covers proper maintenance procedures must be implemented.



Retraining

- ⌘ When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required, the employer shall retrain that employee. Circumstances where retraining is required include, but are not limited to, situations where:
 - ⌘ Changes in the workplace render previous training obsolete
 - ⌘ Changes in the types of PPE to be used render previous training obsolete
 - ⌘ Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill

Written Certification

- ⌘ The employer shall verify that each affected employee has received and understood the required training through a written certification that contains the name of each employee trained, the date(s) of training, and the subject of the certification.

Handling Emergencies

- ⌘ If an eye injury occurs, quick action can prevent a permanent disability. For this reason:



- ✍ Emergency eyewashes should be placed in all hazardous areas
- ✍ First-aid instructions should be posted close to potential danger spots
- ✍ Employees must know where the closest eyewash station is and how to get there with restricted vision

TOP

Criteria for PPE

Eye and face protection must comply with the American National Standards Institute, ANSI Z87.1-1989 standard if purchased after July 5, 1994 or ANSI Z87.1-1968 if purchased before July 5, 1994. [[1910.133\(b\)\(1\)](#), [1915.153\(b\)](#), [1926.102\(a\)\(2\)](#)]

- ✍ Eye and face PPE shall be distinctly marked to facilitate identification of the manufacturer. [[1910.133\(a\)\(4\)](#)]
- ✍ The following minimum requirements must be met by all protective devices. Protectors shall:
 - ✍ Provide adequate protection against the particular hazards for which they are designed
 - ✍ Be of safe design and construction for the work to be performed
 - ✍ Be reasonably comfortable when worn under the designated conditions
 - ✍ Fit snugly and not unduly interfere with the movements of the wearer
 - ✍ Be durable
 - ✍ Be capable of being disinfected
 - ✍ Be easily cleanable
 - ✍ Be distinctly marked to facilitate identification only of the manufacturer

TOP

Fitting of PPE

Consideration should be given to comfort and fit. Poorly fitting eye and face protection will not offer the necessary protection. [[1926.102\(a\)\(6\)\(iii\)](#)]

- ✍ Fitting of goggles and safety spectacles should be done by someone skilled in the procedure.
 - ✍ Prescription safety spectacles should be fitted only by qualified optical personnel.
- ✍ Devices with adjustable features should be fitted on an individual basis to provide a comfortable fit that maintains the device in the proper position.
- ✍ Eye protection from dust and chemical splash should form a protective seal when fitted properly.



- ⌘ Welding helmets and face shields must be properly fitted to ensure that they will not fall off during work operations.

Maintenance and Care of PPE

Employees must be trained in the proper care, maintenance, useful life, and disposal of PPE. [1910.132(f)(1)(v)]

Maintenance:

- ⌘ PPE must be used and maintained in a sanitary and reliable condition.
- ⌘ The use of equipment with structural or optical defects is prohibited. [1926.102(a)(4)]
- ⌘ Pitted lenses, like dirty lenses, can be a source of reduced vision. They should be replaced. Deeply scratched or excessively potted lenses are apt to break.
- ⌘ Slack, worn-out, sweat-soaked, or twisted headbands do not hold the eye protector in proper position. Visual inspection can determine when the headband elasticity is reduced to a point below proper function.



Cleaning:

- ⌘ Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.
- ⌘ Eye and face protection equipment that has been previously used should be disinfected before being issued to another employee.
- ⌘ When employees are assigned protective equipment for extended periods, the equipment should be cleaned and disinfected regularly.
- ⌘ Several methods for disinfecting eye-protective equipment are acceptable. The most effective method is to disassemble the goggles or spectacles and thoroughly clean all parts with soap and warm water.
 - ⌘ Carefully rinse all traces of soap and replace defective parts with new ones.
 - ⌘ Swab thoroughly or completely and immerse all parts for 10 minutes in a solution of germicidal deodorant fungicide.
 - ⌘ Remove parts from solution and suspend in a clean place for air drying at room temperature or with heated air.
 - ⌘ Do not rinse after removing parts from the solution because this will remove the germicidal residue that retains its effectiveness after drying.

Storage:

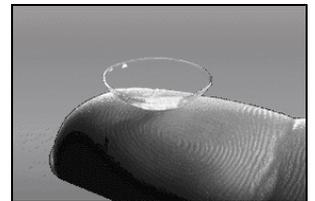
- ⚡ Goggles should be kept in a case when not in use. Spectacles, in particular, should be given the same care as one's own glasses, since the frame, nose pads, and temples can be damaged by rough usage.
- ⚡ Items should be placed in a clean, dust-proof container, such as a box, bag, or plastic envelope, to protect them until reissue.

TOP

Contacts and Prescription (RX) Lenses

Employers must ensure that employees who wear prescription (Rx) lenses or contacts use PPE that incorporates the prescription or use eye protection that can be worn over prescription lenses. [[1910.133\(a\)\(3\)](#), [1915.153\(a\)\(3\)](#), [1926.102\(a\)\(3\)](#)]

- ⚡ Workers who wear prescription glasses must also wear required eye protection.
 - ⚡ Eye and face protection that fits comfortably over glasses is available.
 - ⚡ Safety goggles and spectacles may incorporate prescription lenses.
- ⚡ Dust and chemicals present additional hazards to contacts wearers. OSHA recommends that workers have an extra pair of contacts or eyeglasses in case of contact failure or loss.



The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. To select PPE for the workplace, see the [Hazard Assessment](#) module.

TOP

[Home](#) | [Scope](#) | [FAQs](#) | [Glossary](#) | [Additional References](#) | [Viewing/Printing Instructions](#) | [Credits](#) | [PPE Selection](#) | [OSHA Requirements](#) |

[Back to Top](#)

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Eye and Face Protection eTool

Scope and Application

OSHA's Eye and Face Protection eTool provides compliance assistance to employers and employees, helps implement requirements for a hazard assessment, and aids in the selection of eye and face protective equipment. The following OSHA standards apply when selecting proper eye and face protection for the workplace:

- ⌘ [1910.132](#) - General requirements
- ⌘ [1910.133](#) - General Industry
- ⌘ [1915.153](#) - Maritime
- ⌘ [1926.102](#) - Construction

OSHA's Eye and Face Protection eTool applies to occupational and educational operations involving potential eye and face hazards. PPE devices alone should not be relied upon to provide protection against hazards but should be used in conjunction with guards, engineering controls, and sound manufacturing practices.





Frequently Asked Questions

- [1. What is eye and face protection?](#)
- [2. When is the use of eye and face protection required?](#)
- [3. Can any eye and face protection be used?](#)
- [4. Who certifies PPE?](#)
- [5. How can certified eye and face protection be recognized?](#)
- [6. When must an employer provide eye and face protection for employees?](#)
- [7. Is training required before eye and face protection is used?](#)
- [8. Why is a formal eye and face protection program needed?](#)
- [9. Who is in charge of the protection program?](#)
- [10. What do employees need to know about the eye and face protection program?](#)
- [11. What can be done if an employee has a very small face and has trouble being fit tested for a PPE?](#)
- [12. If employees wear eyeglasses with prescription lenses, are these considered eye protection?](#)
- [13. Can employees wear glasses while wearing eye and face protection?](#)
- [14. What maintenance and care is required for eye and face protection?](#)
- [15. My employees work in shifts. Could I provide one pair of protective eyewear for each position instead of each employee?](#)
- [16. What is the proper way to store protective devices that are used routinely?](#)
- [17. What are the employer's obligations when eye and face protection is not required but employees wear eye and face protection of their own accord?](#)
- [18. Can face shields protect employees instead of safety goggles or spectacles?](#)
- [19. How dark do lenses on welding helmets and safety goggles need to be?](#)
- [20. How do I protect employees from exposure to laser beams?](#)

Q: What is eye and face protection?

A: Eye and face protection is protective equipment such as spectacles, goggles, face shields, or welding shields that are designed to protect the wearer against a variety of hazards.

Q: When is the use of eye and face protection required?

A: OSHA's eye and face protection standard, [29 CFR 1910.133](#), requires the use of eye and face protection when workers are exposed to eye or face hazards such as flying objects, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

Q: Can any eye and face protection be used?

A: No, eye and face protection must be selected on the basis of hazards to which the worker is exposed (i.e., impact, penetration, compression, chemical, heat, harmful dust, light radiation, or combination).

Q: Who certifies PPE?

A: The American National Standards Institute (ANSI).

Q: How can certified eye and face protection be recognized?

A: Certified protective devices shall be marked permanently and legibly by the manufacturer, so that it can be easily identified. The mark shall not interfere with wearer's vision.

Q: When must an employer provide eye and face protection for employees?

A: Employers must provide eye protection for employees whenever they are exposed to potential eye injuries during their work if work practice or engineering controls do not eliminate the risk of injury.

Q: Is training required before eye and face protection is used?

A: Yes, training must be provided to employees who are required to use eye and face protection. The training must be comprehensive, understandable, and recur annually, and more often if necessary. This training should include at a minimum:

- ✍ Why the eye and face protection is necessary and how improper fit, use, or maintenance can compromise its protective effect.
 - ✍ Limitations and capabilities of the eye and face protection.
 - ✍ Effective use in emergency situations.
 - ✍ How to inspect, put on and remove.
 - ✍ Maintenance and storage.
 - ✍ Recognition of medical signs and symptoms that may limit or prevent effective use.
 - ✍ General requirements of OSHA's eye and face protection standard, 29 CFR 1910.133
-

Q: Why is a formal eye and face protection program needed?

A: The eye and face protection program increases the chances of using equipment correctly. Eye and face Protection will only protect if it is used correctly. Also, OSHA requires a number of written elements for all PPE protection programs.

Q: Who is in charge of the protection program?

A: The program must be administered by a trained program administrator who is qualified and knowledgeable in eye and face protection to run all aspects of the program.

Q: What do employees need to know about the eye and face protection program?

A: Employers must establish and implement a written eye and face protection program with worksite-specific procedures and elements for required eye and face protective equipment use. The provisions of the program include procedures for selection, medical evaluation, fit testing, training, use and care of eye and face protection.

Q: What can be done if an employee has a very small face and has trouble being fit tested for a PPE?

A: Manufacturers make several different sizes. Eye and face protection may also vary in size from manufacturer to manufacturer. Users may be able to get a better fit by trying eye and face protection made by another manufacturer. Employers must help employees find suitable eye and face protection.

Q: If employees wear eyeglasses with prescription lenses, are these considered eye protection?

A: No. Eyeglasses designed for ordinary wear do not provide the level of protection necessary to protect against workplace hazards.

Q: Can employees wear glasses while wearing eye and face protection?

A: Yes, special care must be taken when choosing eye protectors for employees who wear eyeglasses with corrective lenses such as the following:

- ⌘ Prescription spectacles, with side shields and protective lenses meeting the requirements of ANSI Z87.1, that also correct the individual employee's vision.
 - ⌘ Goggles that can fit comfortably over corrective eyeglasses without disturbing the alignment of the eyeglasses.
 - ⌘ Goggles that incorporate corrective lenses mounted behind protective lenses.
-

Q: What maintenance and care is required for eye and face protection?

A: It is important that all eye and face protection be kept clean and properly maintained. Cleaning is particularly important where dirty or fogged lenses could impair vision.

Eye and face protection should be inspected, cleaned, and maintained at regular intervals so that equipment provides the requisite protection. It is also important to ensure that contaminated equipment which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

Q: My employees work in shifts. Could I provide one pair of protective eyewear for each position instead of each employee?

A: Yes. If you do this, however, you must disinfect shared protective eyewear after each use. If the goggles or spectacles do not have it be individually designed to incorporate an employee's corrective lenses and you disinfect the eyewear between uses by different employees, more than one employee may use the same set of protective eyewear.

Q: What is the proper way to store protective devices that are used routinely?

A: Goggles should be kept in a case when not in use. Spectacles, in particular, should be given the same care as one's own glasses, since the frame, nose pads, and temples can be damaged by rough usage.

After disinfecting eyewear, the dry parts or items should be placed in a clean, dust-proof container, such as a box, bag, or plastic envelope, to protect them until reissue.

Q: What are the employer's obligations when eye and face protection is not required but employees wear eye and face protection of their own accord?

A: The employer must implement those elements of the written eye and face protection program necessary to ensure that any employee using eye and face protection voluntarily is medically able to use that PPE, and that the eye and face protection is cleaned, stored, and maintained so its use does not present a health hazard to the user. Also, employers must provide the voluntary eye and face protection users with the information contained in OSHA's Eye and Face Protection Standard [29 CFR 1910.133](#)

Employers are not required to include in a written eye and face protection program those employees whose only use of eye and face protection involves the voluntary use of PPE.

Q: Can face shields protect employees instead of safety goggles or spectacles?

A: Face shields alone do not protect employees from impact hazards. Face shields may be used in combination with safety goggles or spectacles to protect against impact.

Q: How dark do lenses on welding helmets and safety goggles need to be?

A: The intensity of light or radiant energy produced by welding, cutting, or brazing

operations varies according to a number of factors including the task producing the light, the electrode size, and the arc current. To protect employees who are exposed to intense radiant energy, begin by selecting a shade too dark to see the welding zone. Then try lighter shades until you find one that allows a sufficient view of the welding zone without going below the minimum protective shade.

Q: How do I protect employees from exposure to laser beams?

A: You must provide safety goggles specifically designed to protect the employees' eyes from the specific intensity of light produced by the laser. The level of protection will vary according to the level of radiation emitted by the laser. If your employees are exposed to laser beams, you must determine the maximum power density, or intensity, that the lasers can produce. Based on this knowledge, you must select lenses that will protect against this maximum intensity. Employers with lasers emitting radiation between two measures of power density (or light blocking capability) must provide lenses that offer protection against the higher of the two intensities.

Q: How can I be sure that laser safety goggles provide enough protection?

A: Every pair of safety goggles intended for use with laser beams must bear a label with the following information:

- ⌘ The laser wavelengths for which they are intended to be used.
- ⌘ The optical density of those wavelengths.
- ⌘ The visible light transmission.



[| Home](#) | [| Scope](#) | [| FAQs](#) | [| Glossary](#) | [| Additional References](#) |
[| Viewing/Printing Instructions](#) | [| Credits](#) | [| PPE Selection](#) |
[| OSHA requirements](#) | [| Disclaimer](#) |



Glossary

cleanable: to be free of dirt or debris without being damaged by the cleaning process.

face shield: protective equipment generally used to protect the wearer's face, or portions thereof, in addition to the eyes, from a variety of hazards. Face shields are secondary protectors and must be worn only with primary protective devices.

filter lens: a lens that protects against various degrees of ultraviolet, visible, and infrared rays.

front: the portion of a protective device frame that is intended to hold the lens or lenses.

glare: uncomfortably bright light not including dangerous degrees of ultraviolet or infrared light.

goggle: goggles fit the face directly surrounding the eyes in order to protect the eyes from a variety of hazards. They can be used as a primary protector, or in combination with other eye and face protection.

hand shield: a hand-held welding helmet.

headgear: the part of the protective equipment, such as a protective helmet, hood or face shield that supports the device on the user's head.

hood: protective equipment that covers the head, neck, and portions of the shoulders.

impact resistance: the capacity of a device to resist impact.

infrared radiation (IR): Invisible electromagnetic radiation with wavelengths which lie within the range of 0.70 to 1000 μm .

laser: An acronym for light amplification by stimulated emission of radiation. A laser is a cavity with mirrors at the ends, filled with material such as crystal, glass, liquid, gas or dye. It produces an intense beam of light with the unique properties of coherency, collimation, and monochromaticity.

lens, impact-resistant: a lens designed and tested to resist breakage when impacted by an object.

lens, non-removable: a lens that is permanently attached to a frame.

lens, plano: a lens that does not include a corrective prescription, afocal.

lens, prescriptive: a lens made for an individual's specific vision correction.

lens, special purpose: a lens that is designed for visual tasks which require unusual filtering of light.

lift-front: a lens that may be raised from its usual down position as needed.

light: The range of electromagnetic radiation frequencies detected by the eye, or the wavelength range from about 400 to 760 nm. The term is sometimes used loosely to include radiation beyond visible limits.

optical density: A logarithmic expression for the attenuation produced by an attenuating medium, such as an eye protection filter.

optical radiation: Ultraviolet, visible, and infrared radiation (0.35-1.4 μm) that falls in the region of transmittance of the human eye.

photochromic lens: a lens designed to darken when exposed to sunlight and fade when removed from the sunlight.

primary protector: personal protective device such as spectacles or goggles that may be worn alone or in combination with a secondary protector.

radiant energy (Q): Energy in the form of electromagnetic waves usually expressed in units of Joules (watt-seconds).

secondary protector: personal protective equipment that can only be worn in combination with a primary protector.

side shield: a device attached to the front of the frame designed to provide angular protection from impact hazards.

spectacles: protective devices intended to safeguard the wearer's eyes from a variety of hazards. They are generally used to provide primary protection from impact and optical radiation.

temple: the component of an eye and face protective device extending from the frame to the ear, designed to fit the wearer and hold the device into place.

ultraviolet (UV) radiation: Electromagnetic radiation with wavelengths between soft X-rays and visible violet light, often broken down into UV-A (315-400 nm), UV-B (280-315 nm), and UV-C (100-280 nm).

visible radiation (light): Electromagnetic radiation which can be detected by the human eye. It is commonly used to describe wavelengths in the range between 400 nm and 700-780 nm.

wavelength: The length of the light wave, usually measured from crest to crest, which determines its color. Common units of measurement are the micrometer (micron), the nanometer, and (earlier) the Angstrom unit.

welding helmet: a shielding device using special absorptive lenses that filter the intense light and radiant energy that is produced during welding operations.

window: a transparent protective device.

window, non-removable: a window that is permanently attached to a frame or headgear.



[| Home](#) | [| Scope](#) | [| FAQs](#) | [| Glossary](#) | [| Additional References](#) |
[| Viewing/Printing Instructions](#) | [| Credits](#) | [| PPE Selection](#) |
[| OSHA requirements](#) | [| Disclaimer](#) |

 [Back to Top](#)

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[Home](#)	[Scope](#)	[FAQs](#)	[Glossary](#)	[Additional References](#)
[Viewing/Printing Instructions](#)	[Credits](#)	[PPE Selection](#)		
[OSHA requirements](#)	[Disclaimer](#)			

 [Back to Top](#)

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Other Resources

- ✂ OSHA Health Standards
- ✂ OSHA Directorate of Compliance Programs
- ✂ National Institute of Occupational Safety and Health
- ✂ ANSI Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection



[| Home](#) | [| Scope](#) | [| FAQs](#) | [| Glossary](#) | [| Additional References](#) |
[| Viewing/Printing Instructions](#) | [| Credits](#) | [| PPE Selection](#) |
[| OSHA requirements](#) | [| Disclaimer](#) |

 [Back to Top](#)

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