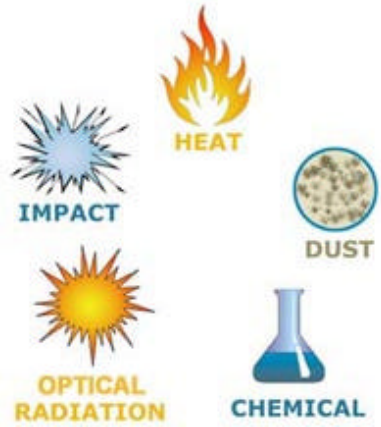
PPE Selection
- Impact
- Heat
- Chemicals
- Dust
- Optical Radiation

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.

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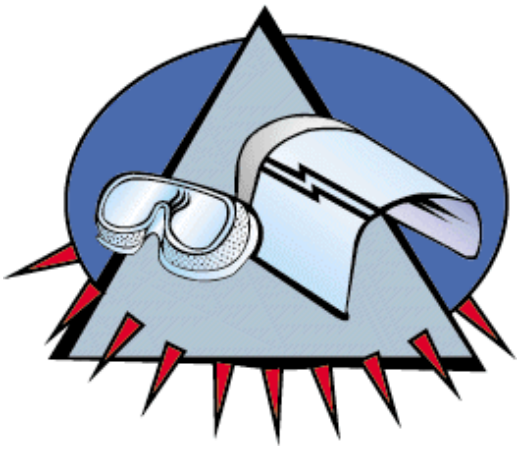
PPE Selection: Impact Hazards

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

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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

Fig. 1:
Plano Lenses

- Prescription (Rx) lenses:
  - Should be used by workers who require vision correction
  - May be clear, filtered, or tinted
  - May include removable lenses

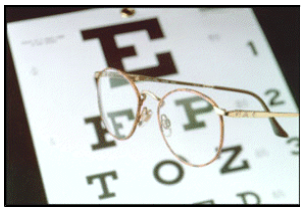

Fig. 2:
Prescription Lenses

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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

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. 6:
Flatfold Side Shields

- Full (cup) side shields may be:
  - Removable
  - Wire screen
  - Tinted or clear

Fig. 7:
Full (cup) Side Shields

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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

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

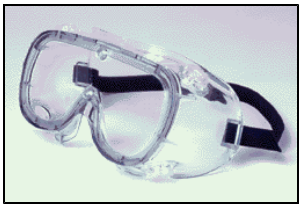

Fig. 3: Cover Goggles

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

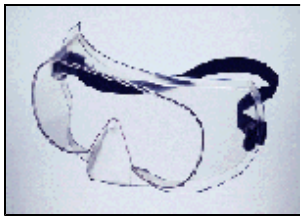

Fig. 6:
Non-ventilated goggles

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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

Figure 1: Plastic Window

- Wire-screen windows:
  - May include a plastic/glass insert
  - Protect against some moderate impact

- 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

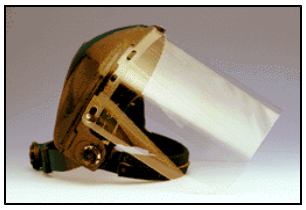

Figure 3:
Adjustable Headgear

- 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

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

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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

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

Fig. 1:
Plano Lenses

- Prescription (Rx) lenses:
  - Should be used by workers who require vision correction
  - May be clear, filtered, or tinted
  - May include removable lenses

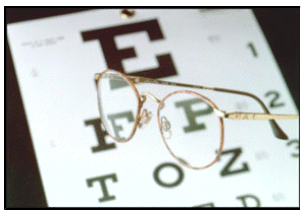

Fig. 2:
Prescription Lenses

- 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

TOP

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

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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

Fig. 3: 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. 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

Fig. 5:
Direct-ventilated Goggles

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

Fig. 6:
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

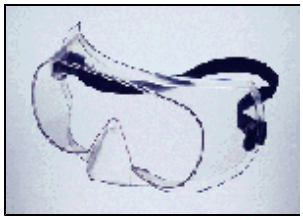

Fig. 7:
Non-ventilated goggles

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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

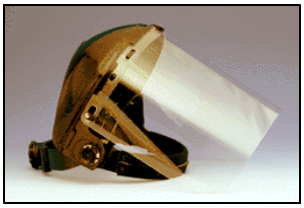

Figure 3:
Adjustable Headgear

- 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

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

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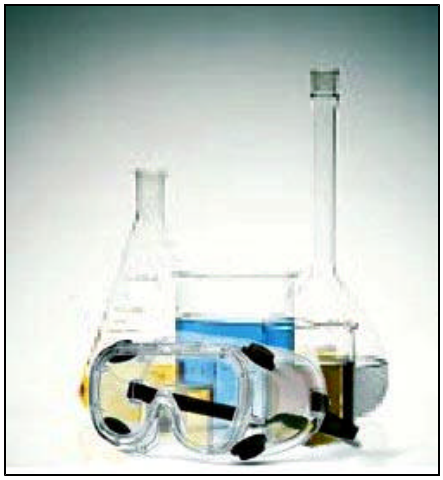
Chemicals: Goggles



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

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

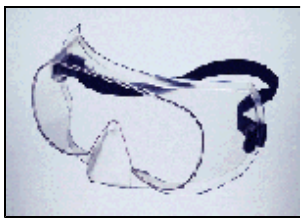


Fig. 6:
Non-ventilated goggles

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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

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

Figure 1: Plastic Window

- 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

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

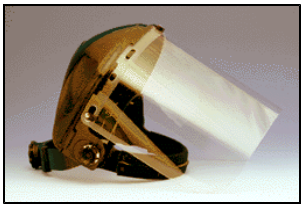

Figure 2:
Adjustable Headgear

- 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

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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 causes 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.

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

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

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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

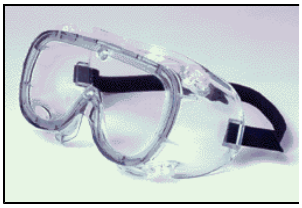

Fig. 3:
Cover Goggles

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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

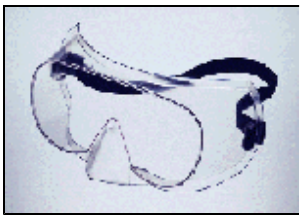

Fig. 6:
Non-ventilated goggles

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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

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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

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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

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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

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Optical Radiation: Laser Protection

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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.

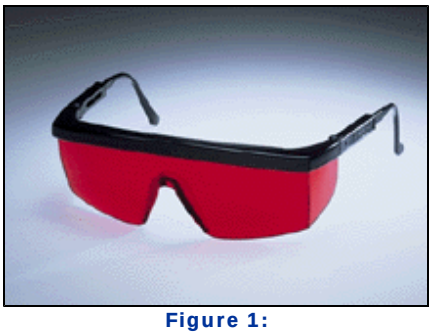

Figure 1:
Laser Safety Lenses

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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.

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