



## Appendix B: Eye and Face Protection

### Compliance with National Standards

All personal protective clothing and equipment must be of safe design and construction for the work to be performed and must be maintained in a sanitary and reliable condition.

Eye and face protection used by employees must meet NIOSH or ANSI (American National Standards Institute) standards as follows:

- Protective eye and face devices purchased after July 5, 1994 must comply with ANSI Z87 .1-1989, "American National Standard Practice of Occupational and Education Eye and Face Protection".
- Eye and face protective device purchased before July 5, 1994 must comply with the ANSI Z87 .1-1968 "USA Standard for Occupational and Educational Eye and Face Protection."
- The referenced standards do not apply to hazards related to X-rays, gamma rays, high-energy particulate radiation, microwaves, radio-frequency radiation, or work with lasers and masers. Information on PPE required for work involving these hazards is available through:
  - The Radiation Safety division of EHSS for ionizing radiation; and,
  - The Occupational Health and Industrial Hygiene divisions of EHSS for non-ionizing radiation.

### General Requirements

Employees must use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, acids or caustic liquids or other liquid chemicals, chemical gases or vapors, or potentially hazardous light radiation.

Each affected employee must use eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors (e.g. clip-on or slide-on shields) are acceptable if they meet the ANSI requirements.

Eye and face PPE must be marked to identify the manufacturer.

Face shields must be used in combination with goggles when there is a potentially significant chemical splash hazard.

Face shields must be worn over primary eye protection (safety glasses or goggles) when there is a potentially severe exposure to flying fragments or objects, hot sparks from furnace operations, potential splash from molten metal, or extreme temperatures.

The [Selection Chart for Eye and Face Protection](#) located at the end of this appendix provides guidance on how to select appropriate PPE for the hazards that you identify during the hazard assessment process.



Each affected employee who wears prescription lenses, while engaged in operations that involves eye hazards, must either:

- Wear eye protection that incorporates the prescription in its design, or,
- Wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

Each affected employee must use equipment with filter lenses that have a shade number appropriate for the work being performed for protective from injurious light radiation. Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.

## Types of Eye and Face Protection

### Safety Glasses

Protective eyeglasses are made with safety frames, tempered glass or plastic lenses, temples and side shields which provide eye protection from moderate impact and particles encountered in job tasks such as carpentry, woodworking, grinding, scaling, etc. Prescription safety glasses and tinted lenses are also available.



Standard safety glasses are designed to protect against flying particles. Safety glasses have lenses that are impact resistant and frames that are far stronger than regular eyeglasses.

### Safety Goggles

Vinyl framed goggles of soft pliable body design provides adequate eyes protection from many hazards. These goggles are available with clear or tinted lenses, perforated, port vented, or non-vented frames. Single lens goggles provide similar protection to spectacles and may be worn in combination with spectacles or corrective lenses to ensure protection along with proper vision.



Like safety glasses, goggles are impact resistant and are available with tinted lenses.

Goggles offer the best all-around impact protection of all eyewear types because they form a positive seal around the eye area.

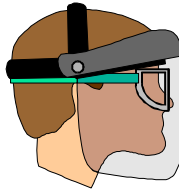
### Welders/Chippers Goggles

Welders and chippers goggles are available in rigid and soft frames to accommodate single or two-eyepiece lenses.

Welders' goggles provide protection from sparking, scaling, or splashing metals and harmful light rays. Lenses are impact resistant and are available in graduated shades of filtration.

Chippers/Grinders goggles provide eye protection from flying particles. The dual protective eyecup house impact resistant clear lenses with individuals cover plates.

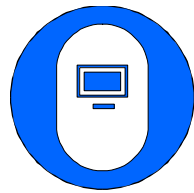
Appropriate shade numbers for various operations are listed in [Table 1](#).



### Face Shields

Face shields normally consist of an adjustable head gear and face shield of either tinted or transparent acetate or polycarbonate materials, or wire screen. Face shields are available in various sizes, tensile strength, impact/heat resistance and light ray filtering capacity.

Face shields are used in operations when the entire face needs protection and to protect the eyes and face against flying particles, metal sparks, and chemical or biological splash hazards.



### Welding Helmets and Shields

The shield assemblies consist of a vulcanized fiber or glass fiber body, a ratchet or button type adjustable headgear or cap attachment, and a filter and cover plate holder.

These shields must be provided to protect workers' eyes and face from infrared or radiant light burns, flying sparks, metal spatter and slag chips encountered during welding, brazing, soldering, resistance welding, bare or shielded electrical arc welding and oxyacetylene work.

Appropriate shade numbers for various operations are listed in [Table 1](#).

### Storage and care

Safety glasses and other eye and face protection should be stored carefully so they won't be scratched or damaged. In general, do not store this equipment where it would be exposed to high heat or sunlight.

Inspect eye and face protection prior to use. If the equipment is damaged or broken do not use it because it may not be able to fully resist impact.

Pitted lenses, like dirty lenses, make it more difficult for an employee to see and should be replaced. Lenses that are pitted or deeply scratched are more prone to break under impact and should be replaced.

Clean eye and face protection according to the manufacturer's instructions. If the manufacturer's instructions are not available, clean with a mild soap and water solution by soaking in the soap solution (maintained at 120°F) for ten minutes. Rinse thoroughly and allow to air dry.

PPE that has been previously used should be disinfected before being issued to another employee. PPE may be disinfected by completely immersing all parts in a solution of germicidal fungicide for 10 minutes. Remove the parts from the solution and allow to air dry at room temperature.

Table 1

Filter Lenses for Protection against Radiant Energy

<b>Operations</b>	<b>Electrodes Size 1/32 Inches</b>	<b>Arc Current</b>	<b>Minimum Protective Shade</b>
<b>Shielded metal arc welding</b>	less than 3	less than 60	7
	3-5	60-160	8
	5-8	60-250	10
	more than 8	250-550	11
<b>Gas metal arc welding Flux cored arc welding</b>		less than 60	7
		60-160	10
		60-250	10
		250-500	10
<b>Gas Tungsten arc welding</b>		less than 50	8
		50-150	8
		150-500	10
<b>Air Carbon</b>	Light	less than 500	10
<b>Air cutting</b>	Heavy	500-1000	11
<b>Plasma arc welding</b>		less than 20	6
		20-100	8
		100-400	10
		400-800	11
<b>Plasma arc cutting</b>	light*	less than 300	8
	medium**	300-400	9
	heavy**	400-800	10
<b>Torch Brazing</b>			3
<b>Torch soldering</b>			2
<b>Carbon arc welding</b>			14

Table 1 continues on the next page.

\* As a rule of thumb start with a shade that is too dark to see the weld zone then switch a lighter shade which gives sufficient view of the weld zone without going below the minimum shade allowed. In oxyfuel gas welding or cutting where the torch produces a high yellow light, use a filter lens that absorbs the yellow (sodium line) in the visual light of the (spectrum) operation.  
 \*\* These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the work piece.

Table 1 Continued  
Filter Lenses for Protection against Radiant Energy

<b>Operations</b>	<b>Plate thickness- inches</b>	<b>Plate thickness-mm</b>	<b>Minimum* Protective Shade</b>
<b>Gas Welding</b>			
Light	Under 1/8	Under 3.2	4
Medium	1/8 to 1/2	3.2 to 12.7	5
Heavy	Over 1/2	Over 12.7	6
<b>Oxygen cutting</b>			
Light	Under 1	Under 25	3
Medium	1 to 6	25 to 150	4
Heavy	Over 6	Over 150	5
Carbon arc welding			14

\* As a rule of thumb start with a shade that is too dark to see the weld zone then switch a lighter shade which gives sufficient view of the weld zone without going below the minimum shade allowed. In oxyfuel gas welding or cutting where the torch produces a high yellow light, use a filter lens that absorbs the yellow (sodium line) in the visual light of the (spectrum) operation.

Selection Chart for Eye and Face Protection

The following chart provides general guidance for the proper selection of eye and face protection for hazards associated with the listed hazard “source” operations.

Source	Type of Hazard	Protection
<b>IMPACT</b> -Chipping, grinding, machining, masonry work, woodworking, sawing, drilling chiseling, powered fastening, riveting, and sanding.	Flying fragments, objects, large chips, particles, sand, dirt, etc.	Spectacles with side protection, goggles, and face shields. For severe exposure use face shield over primary eye protection.
<b>HEAT</b> -Furnace operations pouring, casting, hot dipping, welding, cutting and brazing.	Hot sparks	Face shields, goggle, and spectacles with side protection. For severe exposure use face shield. See Notes 1, 2, 3.
	Splash from molten metals	Face shields worn over goggles. See Note 1, 2, 3
	High temperature exposure	Screen face shields, reflective face shields. See note: 1, 2, 3
<b>CHEMICALS</b> - Acid and chemical handling, degreasing, plating	Splash	Goggle, eyecup and cover types. For severe exposure, use face shield. See notes 3, 11
<b>DUST</b> – Woodworking, buffing, general dusty conditions	Irritating mists	Special-purpose goggles
	Nuisance dust	Goggle, eyecup and cover types. See note 8
<b>LIGHT</b> and/or <b>RADIATION</b> Welding Electric arc	Optical radiation	Welding helmets or welding shields. Typical shades (see Table 1 in Appendix B): 10-14. See notes: 9, 12
<b>WELDING</b> : Gas Cutting, Torch brazing Torch soldering.	Optical radiation	Welding goggles or welding face shield. Typical shades (see Table 1 in Appendix B): gas welding 4-8, cutting 3-6, and brazing 3-4. See note 3 and 9 and Appendix B.
<b>GLARE</b>	Poor vision	Spectacles or welding face shield. Typical shades see Table 1 in Appendix B and notes 3 and 9. Spectacles with shaded or special-purpose lenses, as suitable. See notes 9, 10.

Notes to the Selection Chart for Eye and Face Protection may be found on the following page.

**Related Requirements**

Employees working with corrosive chemicals must have immediate access to eyewash and quick drench facilities.



## Notes to Eye and Face Protection Selection Chart

1. Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided. Protective devices do not provide unlimited protection.
2. Operations involving heat may also involve light radiation. When necessary, protection from other hazards must be provided.
3. Face shields should only be worn over primary eye protection (spectacles or goggles).
4. Filter lenses must meet the requirements for shade designations as outlined in the OSHA regulations and ANSI standards. Tinted and shaded lenses are not filter lenses.
5. Persons whose vision requires the use of prescription lenses must wear either protective devices fitted with prescription lenses or protective devices designed to be worn over regular prescription eyewear.
6. Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments might represent an additional hazard to contact lens wearers.
7. Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.
8. Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.
9. Welding helmets or faces shields should be used only over primary eye protection (spectacles or goggles).
10. Non-side shield spectacles are available for frontal protection only, but are not acceptable eye protection for the sources and operations listed for "impact."
11. Must provide adequate ventilation and also protect the wearer from splash entry. Eye and face protection should be designed and used so that it protected both adequate ventilation and protects the wearer from splash entry.
12. Protection from light radiation is directly related to filter lens density. See note (4). Select the darkest shade that allows the task to be performed.

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