

# PERSONAL PROTECTIVE EQUIPMENT

**REFERENCE:** 29 CFR, §1910.1324

## **SUMMARY:**

Distributors are required to assess the workplace to determine if hazards that require the use of personal protective equipment (PPE) are present or are *likely to be present*. If hazards or the likelihood of hazards are found, employers must try to eliminate the hazards through engineering controls or administrative controls. Where these methods are not sufficient, employers must select and have affected employees use properly fitted personal protective equipment suitable for protection from those hazards. The key determining factor is whether there is a "reasonable probability" that injury can be prevented by such equipment.

PPE devices alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound manufacturing practices. **PPE is the last line of defense after all other reasonable measures fail to adequately control exposure to the hazard.** PPE has limitations which do not make it the ideal choice for controlling hazards. Workers must be trained to wear, use, and care for PPE properly; PPE is subject to wear, deterioration, and failure.

## **Terminology:**

"Engineering controls" — methods the employer uses to eliminate the hazard. Examples of engineering controls are enclosing noisy operations within a walled partition to eliminate noise hazard and use of hand trucks to eliminate hazards associated with rolling cylinders.

"Administrative controls" — methods the employer uses to eliminate exposure without personal protective equipment, but with the hazard still existing. Examples of administrative controls would be restricting access to hazard areas or rearranging work areas or schedules so employees are not exposed to the hazard, etc.

"Personal protective equipment" — anything worn or used directly by an employee to eliminate or reduce exposure to an existing hazard. PPE is not limited to typical "safety" items, and may include long sleeve shirts, coats, sunblock lotion, etc.

# GUIDELINES FOR HAZARD ASSESSMENT

In order to assess the need for PPE the following steps should be taken:

## Survey

Conduct a walk-through survey of the areas in question. The purpose of the survey is to identify sources of hazards. Consideration should be given to the basic hazard categories:

- (a) Impact
- (b) Penetration
- (c) Compression (roll-over)
- (d) Chemical
- (e) Heat
- (f) Harmful dust
- (g) Light (optical) radiation

## Sources

During the walk-through survey the safety officer should observe: (a) sources of motion; i.e., machinery or processes where any movement of tools, machine elements or particles could exist, or movement of personnel that could result in collision with stationary objects; (b) sources of high temperatures that could result in burns, eye injury or ignition of protective equipment, etc.; (c) types of chemical exposures; (d) sources of harmful dust; (e) sources of light radiation ( i.e., welding, brazing, cutting, high intensity lights, etc.); (f) sources of falling objects or potential for dropping objects; (g) sources of sharp objects which might pierce the feet or cut the hands; (h) sources of rolling or pinching objects which could crush the feet; (I) layout of workplace and location of co-workers; and (j) any electrical hazards.

In addition, injury/accident data (e.g., Workman's Comp and OSHA 200 logs) should be reviewed to help identify problem areas.

## Organize Data

Following the walk-through survey, it is necessary to organize the data and information for use in the assessment of hazards. The objective is to prepare for an analysis of the hazards in the environment to enable proper selection of protective equipment.

## Analyze Data

Having gathered and organized data on the workplace, an estimate of the potential for injuries should be made. Each of the basic hazards (see Survey) should be reviewed and a

determination made as to the type, level of risk, and seriousness of potential injury from each of the hazards found in the area. The possibility of exposure to several hazards simultaneously should be considered.

Consult Material Safety Data Sheets to determine hazards associated with gases and other hazardous materials.

## **Selection Guidelines**

The general procedure for selection of protective equipment is to: a) Become familiar with the potential hazards and the type of protective equipment that is available, and what it can do (i.e., splash protection, impact protection, etc.); b) compare the hazards associated with the environment (i.e., impact velocities, masses, projectile shape, radiation intensities, with the capabilities of the available protective equipment); c) select the protective equipment which ensures a level of protection greater than the minimum required to protect employees from the hazards; and d) fit the user with the protective device and give instructions on care and use of the PPE. ***It is very important that workers be made aware of all warning labels and limitations of their protective equipment.***

Note: Material Safety Data Sheets contain recommended PPE. Since manufacturers have little or no control over the final use and / or intermediate uses of their products, recommended PPE may not necessarily be required or adequate in all cases.

## **Fitting the Device**

Careful consideration must be given to comfort and fit. PPE that fits poorly will not afford the necessary protection. Also, employees may be tempted to not wear poorly-fitted equipment.

Adjustments should be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position. Particular care should be taken when fitting devices for eye protection against dust and chemical splash to ensure that the devices are sealed to the face. In addition, proper fitting of helmets is important to ensure that they will not fall off during work operations. In some cases a chin strap may be necessary to keep the helmet on an employee's head. (Chin straps should break at a reasonably low force, however, so as to prevent a strangulation hazard). Where manufacturer's instructions are available, they should be followed carefully.

## **Reassessment of Hazards**

It is the responsibility of the safety officer to reassess the workplace hazard situation as necessary, by identifying and evaluating new equipment and processes, reviewing accident records, and reevaluating the suitability of previously selected PPE.

## **Job Hazard Analysis**

Injuries often occur because employees are not trained in the proper job procedure. Establishing proper job procedures is one of the benefits of conducting a job hazard analysis; that is, carefully studying and recording each step of a job, identifying existing or potential job hazards and determining the best way to perform the job to reduce or eliminate these hazards.

Individual job hazard analysis is not specifically required by the PPE standard, but can greatly assist in decreasing reportable injuries. For details, refer to TAB .

# GUIDELINES FOR PPE SELECTION

The following guidelines were taken from the Appendix to the Personal Protective Equipment Standard, 29 CFR, §1910.132.

## SELECTION GUIDELINES FOR HEAD PROTECTION

All head protection (helmets) is designed to provide protection from impact and penetration hazards caused by falling objects. Head protection is also available which provides protection from electric shock and burn. Helmet shell should be marked with ANSI designation ANSI Z89.1-1969 (or later year) and class.

### Electrical Hazards

When selecting head protection, knowledge of potential electrical hazards is important. Class A helmets, in addition to impact and penetration resistance, provide electrical protection from low-voltage conductors (they are proof tested to 2,200 volts). Class B helmets, in addition to impact and penetration resistance, provide electrical protection from high-voltage conductors (they are proof tested to 20,000 volts). Class C helmets provide impact and penetration resistance (they are usually made of aluminum which conducts electricity), and should not be used around electrical hazards.

### Falling Objects

Where falling object hazards are present, helmets must be worn. Some examples include: working below other workers who are using tools and materials which could fall; working around or under conveyor belts which are carrying parts or materials; working below machinery or processes which might cause material or objects to fall; and working on exposed energized conductors. Some examples of occupations for which head protection should be routinely considered are: mechanics and repairers, packers, welders, laborers, freight handlers, stock handlers, and warehouse laborers.

### Recommendation

Consider the following jobs for head protection:

- Warehouse workers if materials are stacked above head-high
- Any jobs where limited head-space is available
- Areas with overhead hoists, such as hydrostatic testing facilities

## SELECTION GUIDELINES FOR EYE & FACE PROTECTION

SOURCE	HAZARD ASSESSMENT	PROTECTION
IMPACT - Chipping, grinding, machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Flying fragments, object, large chips, particles, sand, dirt, etc.	See notes (1), (3), (5), (6), (10). For severe exposure, use face shield
	Hot sparks	Face shields, goggles, 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 notes (1),(2),(3).
	High temperature exposure	Screen face shields, reflective face shields. See notes (1),(2),(3).
HEAT - Furnace operations, hot sparks, pouring, casting, hot dipping, and welding	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield. See notes (3),(11).
	Irritating mists	Special-purpose goggles
	Nuisance dust	Goggles, eyecup and cover types. See note (8).
CHEMICALS - acid and chemicals handling, degreasing, plating.	Optical radiation	Welding helmets or welding shields. Typical shades: 10-14. See notes (9),(12).
	Optical radiation	Welding goggles or welding face shield. Typical shades: gas welding 4-8, cutting 3-6, brazing 3-4. See note (9).
DUST - woodworking, buffing, general dusty conditions	Optical radiation	Spectacles or welding face-shield. Typical shades, 1.5-3. See notes (3),(9).
	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable. See notes (9),(10).
LIGHT and/or RADIATION- Welding, electric arc		
Welding, gas		
Cutting, Torch brazing, Torch soldering		
Glare		

**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. As required by the standard, protection from both hazards must be provided.

(3) Face shields should only be worn over primary eye protection (spectacles or goggles).

(4) As required by the standard, filter lenses must meet the requirements for shade designations in 1910.133(a)(5). Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.

(5) As required by the standard, persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) 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 may 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 Face shields should be used only over primary eye protection (spectacles or goggles).

(10) Non-sideshield spectacles are available for frontal protection only, but are not acceptable eye protection for the sources and operations listed for "impact."

(11) Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides 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 task performance.

Eye and face protection purchased prior to July 5, 1994, must be in accordance with ANSI Z87.1-1968. Devices purchased after July 5, 1994, must comply with ANSI Z87.1-1989.

## Recommendation

Eye protection should be routinely considered for welders, cylinder fillers and employees working in dusty operations. Eye and face protection (face shields) are especially important for employees performing grinding or wire-brush operations, battery charging, and liquid cylinder filling.

## SELECTION GUIDELINES FOR FOOT PROTECTION

Safety shoes and boots which meet the ANSI Z41-1991 Standard provide both impact and compression protection. Where necessary, safety shoes can be obtained which provide puncture protection. In some work situations, metatarsal protection should be provided, and in other special situations electrical conductive or insulating safety shoes would be appropriate.

Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and, for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as cable or hose) and around heavy pipes, all of which could potentially roll over an employee's feet. Safety shoes or boots with puncture protection would be required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal etc., could be stepped on by employees, causing a foot injury.

Footwear purchased prior to July 5, 1994, must comply with ANSI Z41.1-1967.  
Footwear purchased after July 5, 1994, must comply with ANSI Z41-1991.

## Recommendation

Foot protection should be routinely considered for: shipping and receiving clerks, stock clerks, electricians, machinists, mechanics and repairers, structural metal workers, packers, welders, laborers, freight handlers, stock handlers, warehouse laborers, drivers, and all plant personnel.

At a minimum, employees who handle compressed gas cylinders should wear shoes with impact protection and compression protection. Metatarsal protection is recommended for plant personnel and drivers.

## SELECTION GUIDELINES FOR HAND PROTECTION

Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. OSHA is unaware of any gloves that provide protection against all potential hand hazards, and commonly available glove materials provide only limited protection

against many chemicals. Therefore, it is important to select the most appropriate glove for a particular application and to determine how long it can be worn, and whether it can be reused. It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated (e.g., chemical hazards, cut hazards, flame hazards, etc.) These performance characteristics should be assessed by using standard test procedures. Before purchasing gloves, request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated.

### Chemical-resistant gloves

With respect to selection of gloves for protection against chemical hazards, consider the following::

- The toxic properties of the chemical(s) must be determined; in particular, the ability of the chemical to cause local effects on the skin and/or to pass through the skin and cause systemic effects;
- Generally, any "chemical resistant" glove can be used for dry powders;
- For mixtures and formulated products (unless specific test data are available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials; and
- Employees must be able to remove the gloves in such a manner as to prevent skin contamination.

### Recommendation

- Chemical-resistant gloves: Consult the MSDS for chemicals to determine recommended PPE. Most solvents, battery electrolyte, cleaning chemicals, etc. will require chemical-resistant gloves.
- Cotton "work gloves" are usually sufficient for cylinder handling and most general material handling.



Some job functions may become more hazardous with the use of gloves. **Soiled work gloves are not appropriate when performing odor testing on oxygen.** Odor is tainted from the smell of the glove. Also, oxygen may react with dirt, grease, etc. in the glove.

## OTHER

Other job functions may also require PPE use. Consider:

- Hearing protection in cylinder filling plants.
- Respiratory protection when filling toxic gases or working in areas where contaminants exceed the PEL (Permissible Exposure Limit) such as paint spraying, acetylene generator clean-out, shot-blasting, etc. Contamination measurements must be made to make this determination. An industrial hygienist or an insurance company's loss control specialist should be able to assist.

## CLEANING AND MAINTENANCE

It is important that all PPE be kept clean and properly maintained. Manufacturers' instructions for cleaning and maintenance should be followed. For the purposes of compliance with the Standard, PPE should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection. It is also important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

## TRAINING

Before doing work requiring use of PPE, employees must be trained to know when PPE is necessary; what type is necessary; how it is to be worn; and what its limitations are, as well as know its proper care, maintenance, useful life, and disposal.

Distributors must certify in writing that training has been carried out and that employees understand it. Each written certification must contain the name of each employee trained, the date(s) of training, and identify the subject (e.g., canister-type respirator, SCBA, etc.) The NWSA safety training record on the back of each month's Safety Topic can be used to meet this requirement.



Job experience is not a substitute for personal protective equipment. Experienced employees must be afforded the same degree of protection as beginning employees.

## PPE Hazard Assessment & Certification Form

**Instructions:** To complete and document your PPE hazard assessment use this form in conjunction with the *Guidelines for Hazard Assessment* from your GAWDA OSHA Manual, Section 31. Once the hazard assessment is complete refer to *the Guidelines for PPE Selection* from the same manual section for the selection of the appropriate PPE.

Location: \_\_\_\_\_ Area: \_\_\_\_\_

Job Classification: \_\_\_\_\_ Task Performed: \_\_\_\_\_

Date: \_\_\_\_\_ Name of Assessor: \_\_\_\_\_

**Head Hazards:** Tasks that can cause head hazards include: Suspended loads that could fall, sharp objects or corners at head level, working below other workers who are using tools and materials that could fall, working on energized electrical equipment, working with chemicals and working under machinery or processes which might cause materials or objects to fall.

Check the box for each **Head Hazard:**

			Description of Hazards
Burn	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Chemical Splash	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Electrical Shock	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Impact	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____

**Eye Hazards:** Tasks that can cause eye hazards include: Working with chemicals, high pressure, cryogenics, chipping; grinding, sanding, welding, lasers/optical radiation, working around energized electrical equipment, and woodworking.

Check the box for each **Eye Hazard:**

			Description of Hazards
Chemicals	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Dust	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Heat	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Impact	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Light/Radiation	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____

**Hand Hazards:** Tasks that can cause hand hazards include: cutting material, material handling, working with chemicals and cryogenics, working on energized electrical equipment, and working with hot objects.

Check the box for each **Hand Hazard:**

			Description of Hazard
Burns	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Chemical Exposure	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Cuts/Abrasion	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Puncture	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____

**Foot Hazards:** Tasks that can cause foot hazards include: carrying or handling heavy material that could be dropped, performing manual material handling, working in wet or slippery conditions, working with chemicals, and working on energized electrical equipment.

Check that box for each **Foot Hazard:**

			Description of Hazard
Chemical Exposure	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Compression	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Impact	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____
Puncture	<input type="checkbox"/> Yes	<input type="checkbox"/> No	_____

**Based on this hazard assessment the following PPE is required:**

Eye Hazard	Job	PPE
_____	_____	_____
_____	_____	_____
_____	_____	_____

Head Hazard	Job	PPE
_____	_____	_____
_____	_____	_____
_____	_____	_____

<b>Foot Hazard</b>	<b>Job</b>	<b>PPE</b>

<b>Hand Hazard</b>	<b>Job</b>	<b>PPE</b>

<b>Other Hazard</b>	<b>Job</b>	<b>PPE</b>

**I certify that the above hazard assessment was performed to the best of my knowledge and ability based on the hazards present on \_\_\_\_\_ .**

\_\_\_\_\_  
**Signature**