



What is personal protective equipment?

Protect yourself with personal protective equipment

Hard hats, goggles, face shields, steel-toed shoes — what do all these items have in common? They all are forms of personal protective equipment (PPE).

PPE is very important to workers. However, do not rely on PPE to provide solo protection against hazards. Use it in conjunction with guards, engineering controls and safe manufacturing practices.

In most occupational settings, the safety officer must consider guidelines for assessing head, foot, eye, hand and face hazards and to match the protective devices with them.

Additionally, the safety officer and the workers should recognize the various sources of hazards and know the corresponding PPE to reduce the possibility of a serious accident. These sources include:

- Sources of motion, i.e., machinery where any movement of tools, machine elements or particles may exist, or movement of personnel that can result in collision with stationary objects;
- Sources of high temperatures, which can result in burns, eye injury or ignition of protective equipment, etc.;
- Types of chemical exposures;
- Sources of harmful dust;
- Sources of light radiation, i.e., welding, brazing, cutting, furnaces, heat treating, high intensity lights, etc.;
- Sources of falling objects or potential for dropping objects;
- Sources of sharp objects, which might pierce the feet or cut the hands;
- Sources of rolling or pinching objects, which can crush the feet; layout of workplace and location of coworkers;
- Any electrical hazards.

Plus, review all injury/accident data to help identify problem areas.

Selection guidelines

When considering PPE, the person selecting should:

- Become familiar with the potential hazards, the type of protective equipment available and what it can do;
- Compare the hazards associated with the environment, i.e., impact velocities, masses, projectile shape, radiation intensities, with the capabilities of the available protective equipment;
- Select the protective equipment that ensures a level of protection greater than the minimum required to protect employees from the hazards;
- Fit the users with the protective device and give instructions on care and uses of the PPE. It is very important that you make the users aware of all warning labels for and limitations of their PPE.

Proper fitting

Persons supplying the PPE should remember that comfort and fit are very important. If the equipment fits poorly, it will not afford ample protection for the worker. Also, the worker is more likely to wear the PPE if it fits properly. And since PPE comes in a variety of sizes, it is important to select the right size. Adjustments can be made on an individual basis to achieve a comfortable fit. Take particular care in fitting devices for eye protection against dust and chemical splash to ensure that the devices are sealed to the face. Proper fitting of hard hats is important to ensure they will not fall off during work operations. In some cases, a chin strap may be necessary to keep the hard hat on an employee's head. (Chin straps should break at a reasonably low force, however, so as to prevent a strangulation hazard). In addition, it is important to make sure protective foot wear and gloves fit properly. Carefully follow all manufacturer's instructions.

Head protection

All head protection is designed to provide protection from impact and penetration hazards caused by falling objects. Head protection also is available that provides protection from electrical shock and burns. When selecting head protection, knowledge of potential electrical hazards is important. Class A hard hats, in addition to impact and penetration resistance, provide electrical protection from low-voltage conductors (they are proof-tested to 2,200 volts). Class B hard hats, in addition to impact and penetration resistance, provide electrical protection from high-voltage conductors (they are proof-tested to 20,000 volts). Class C hard hats provide impact and penetration resistance (they are usually made of aluminum which conducts electricity). Do not use these hats around electrical hazards.

Where falling object hazards are present, workers must wear hard hats. 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.

Occupations for which head protection should routinely be worn include (but are not limited to) carpenters, electricians, linemen, mechanics and repairers, plumbers and pipefitters, assemblers, packers, wrappers, sawyers, welders, laborers, freight handlers, timber cutters and loggers, stock handlers and warehouse laborers.

Foot and leg protection

Safety shoes and boots that meet the American National Standards Institute (ANSI) Z41-1991 Standard provide both impact and compression protection. Where necessary, obtain safety shoes that provide puncture protection. In some work situations, employers should provide their employees with metatarsal protection and in other special situations, electrical conductive or insulating safety shoes are appropriate.

Safety shoes or boots with impact protection are required for carrying or handling materials such as packages, parts or heavy tools, which workers can drop; and for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection are required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as paper rolls) and

around heavy pipes, all of which may potentially roll over an employee's feet. Safety shoes or boots with puncture protection are required where employees may step on sharp objects such as nails, wire, tacks, screws, large staples, scrap metal, etc., causing a foot injury.

Occupations that should always consider foot protection include: shipping and receiving clerks; stock clerks; carpenters; electricians; machinists; mechanics and repairers; plumbers and pipefitters; structural metal workers; assemblers; drywall installers and lathers; packers; wrappers; craters; punch and stamping press operators; sawyers, welders; laborers; freight handlers; gardeners and grounds-keepers; timber cutting and logging workers; stock handlers and warehouse laborers.

Eye and face protection

Occupations for which you should routinely consider eye protection are: carpenters; electricians; machinists; mechanics and repairers; millwrights; plumbers and pipe fitters; sheet metal workers and tinsmiths; assemblers; sanders; grinding machine operators; lathe and milling machine operators; sawyers; welders; laborers; chemical process operators and handlers; and timber cutting and logging workers. Below are general guidance for the proper selection of eye and face protection to protect against hazards associated with the listed hazard source operations.

- 1) Take care to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Provide adequate protection against the highest level of each of the hazards. Protective devices do not provide unlimited protection.
- 2) Operations involving heat also may involve light radiation. As required by the standard, provide protection from both hazards.
- 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 lenses must wear either protective devices fitted with prescription or protective devices designed to be worn over regular prescription eyewear.

- 6) Wearers of contact lenses also must wear appropriate eye and face protection devices in a hazardous environment. Dusty and/or chemical environments may represent an additional hazard to contact lens wearers.
- 7) Exercise caution 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) Use welding helmets or face shields 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) Design and use 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.

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. No gloves provide protection against all potential hand hazards. 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. Determine how long you can wear it and whether you can reuse it.

It also is important to know the performance characteristics of gloves relative to the specific hazard anticipated, i.e., chemical hazards, cut hazards, flame hazards, etc. Assess these performance characteristics by using standard test procedures. Before purchasing gloves, the employer should request documentation from the manufacturer that the gloves meet the appropriate test standards for the hazards anticipated.

Other factors to consider for glove selection in general include:

- As long as the performance characteristics are acceptable, in certain circumstances, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types;
- Study the work activities of the employee to determine the degree of dexterity required, the duration, frequency, and degree of exposure of the hazard, and the physical stresses that will be applied.

With respect to selection of gloves for protection against chemical hazards:

- Determine the toxic properties of the chemicals; 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, you can use any chemical-resistant glove for dry powders;
- For mixtures and formulated products (unless specific test data are available), select a glove 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;
- Ensure employees can remove the gloves in such a manner as to prevent skin contamination.

Cleaning and maintenance of PPE

It is important to keep all PPE clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision.

For the purposes of complying with OSHA Standard 1910.132 (a) and (b) inspect, clean and maintain PPE at regular intervals so that it provides the requisite protection.

It also is important to ensure contaminated PPE, which you cannot decontaminate; you dispose of in a manner that protects employees from exposure to hazards.