



THE UNIVERSITY OF
ALABAMA IN HUNTSVILLE

Personal Protective Equipment

What is Personnel Protective Equipment- PPE?

- Assortment of Devices and Garments that Protect Workers from Bodily Injury



Who Must Provide PPE

- The Employer must provide PPE to the Employee If...
 - The work environment presents a hazard or likely to present a hazard in the future to any body part of the employee

How to Identify a Hazard

By conducting Job Hazard Analysis The employer shall assess the workplace to decide if hazards are present, or are likely to be present, which require the use of PPE.

Who Must Pay for PPE

- When PPE is required to protect employees, it must be provided by the employer **at no cost** to employees,
- **except** for specific items, such as:
 - Safety-toe footwear,
 - Prescription safety eyewear,
 - Everyday clothing and weather- related gear, and
 - Logging boots

Protecting Employees from Workplace Hazards

1. Engineering Controls
2. Administrative Controls
3. PPE



Engineering Controls
Administrative Controls
Work Practices

Hierarchy of Control Measures

1. Engineering Controls **Most Effective Control**
 2. Administrative Controls
 3. Personal Protective Equipment *Least Effective Control*
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Engineering Controls

Remove or reduce hazard by substitution, isolation, or ventilation

Examples:

- Initial design specifications
- Substitute less harmful material
- Change process
- Enclose process
- Isolate process
- Ventilation

Administrative Controls

Are changes in work practices such as supervision, schedules, and training with the goal of reducing the duration, frequency, and severity of exposure to hazardous situations

Examples:

- Use of wet methods to suppress dust
- Personal hygiene
- Housekeeping and maintenance
- Job rotation of workers

Examples of PPE

- **Eyes** - safety glasses, goggles
- **Face** - face shields
- **Head** - hard hats
- **Feet** - safety shoes
- **Hands and arms** - gloves
- **Bodies** - vests
- **Hearing** - earplugs, earmuffs

Establishing a PPE Program

- First, assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of PPE
- Once the proper PPE has been selected, the employer must provide training to each employee who is required to use PPE

Training

Employees required to use PPE must be trained to know at least the following:

- When PPE is necessary
- What type of PPE is necessary
- How to properly put on, take off, adjust, and wear
- Limitations of the PPE
- Proper care, maintenance, useful life and disposal

Employee Responsibilities

- Attending training sessions on PPE
- Properly wearing the PPE
- Proper care and maintenance of the PPE
- Informing the employer about the need for repair and replacement

Eye Protection:

What are some causes of eye injuries?

- Dust and other flying particles, such as metal shavings or sawdust
- Molten metal that might splash
- Acids and other caustic liquid chemicals that might splash
- Intense light such as that created by welding and lasers

Safety Spectacles

- Made with metal/plastic safety frames
- Most operations require side shields
- Used for moderate impact from particles produced by such jobs as carpentry, woodworking, grinding, and scaling

Goggles

- Usually enclose or protect the eye and the facial area immediately surrounding the eyes from impact, dust, and splashes
- Often worn when using power tools such as drills or chainsaws

Welding Shields

- Protect eyes from burns, flying sparks, metal spatter, and slag chips produced during welding, brazing, soldering, and cutting



Face Shields

- Device used to protect the entire face from flying objects, debris and chemical splashes or potentially infectious fluid.
- Do not protect from impact hazards



Head Protection:

What are some of the causes of head injuries?

- Falling objects
- Bumping head against fixed objects, such as exposed pipes or beams
- Contact with exposed electrical conductors

Classes of Hard Hats

Per ANSI Z89.1-1997

Class G (formerly Class A)

- General service (e.g., mining, building construction, shipbuilding, lumbering, and manufacturing)
- Good impact protection but limited voltage protection

Class E (formerly Class B)

- Electrical work
- Protect against falling objects, high-voltage shock/burn

Class C

- Designed for comfort, offer limited protection
- Protects heads that may bump against fixed objects, but do not protect against falling objects or electrical shock

Hearing Protection

➤ Examples of Hearing Protectors

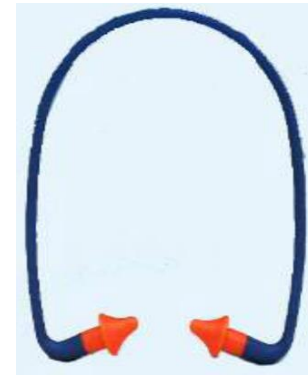
Earmuffs
can reduce noise
by as much as 15
to 30 decibels



Earplugs
foam earplugs to fit
ear canals of
different sizes



Canal Caps
provide less
protection than
earmuffs or plugs



Contact OEHS for a noise level evaluation if you suspect noise pollution

Foot Protection:

Type of Foot Injuries and Common Causes

Injuries	Common Causes
Crushed or broken feet and toes or amputations	Feet trapped between objects, heavy objects falling, trapped under vehicles like lift trucks, bulldozers, etc., conveyor belts
Punctures of the sole of the foot	nails, sharp metal or glass objects
Cuts and lacerations	Chain saws, machinery
Burns	Molten metal splashes, chemical splashes, flammable or explosive atmospheres
Electric shocks	Static electricity, contact with sources of electricity
fractured or broken bones, sprained ankle, trips or falls	Wet floors, objects scattered on the floor and poor housekeeping, poor lighting

Safety Shoes

- Have impact-resistant toes and heat-resistant soles that protect against hot surfaces common in roofing, paving, and hot metal industries
- Metal insoles to protect against puncture wounds
- May be designed to be electrically conductive for use in explosive atmospheres, or nonconductive to protect from workplace electrical hazards

Metatarsal Guards

- A part of the shoes or strapped to the outside of shoes to protect the instep from impact and compression



Hand Protection: Types of Hand Injuries

- Skin absorption of harmful substances
- Severe cuts or lacerations
- Severe abrasions
- Punctures
- Chemical burn
- Thermal burns
- Fractures
- Amputations

Types of Gloves

- Natural Rubber
- Polyvinyl Alcohol (PVC)
- Nitrile
- Butyl
- Viton
- Norfoil
- Wire mesh
- Kevlar
- Welding
- Leather
- Anti-vibration

You can find charts and recommendations for glove compatibility here:

<https://www.calpaclab.com/chemical-compatibility-charts/>

And

https://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf

Types of Gloves cont.

- Norfoil laminate resists permeation and breakthrough by an array of toxic/hazardous chemicals. Resistant to a wide range of solvents, acids, and bases
- Butyl provides the highest permeation resistance to gas or water vapors; frequently used for ketones (M.E.K., Acetone) and esters (Amyl Acetate, Ethyl Acetate).

Types of Gloves cont.

- Viton is made specifically for handling chlorinated and aromatic solvents, exhibit a high degree of impermeability to these solvents and can be used in or around water and water-based solutions. Viton also has superior resistance to PCBs
- Nitrile provides protection against a wide variety of solvents, harsh chemicals, fats and petroleum products and also provides excellent resistance to cuts, snags, punctures and abrasions.

Types of Gloves cont.

- Kevlar protects against cuts, slashes, and abrasion.
- Stainless steel mesh protects against cuts and lacerations.

Which Glove is Best?

Glove	Uses
Cotton	Light duty material handling and cleanup work
Leather	Equipment handling, general construction, heavy cleanup, welding, moderately hot or cold material handling
Shock absorbing	Operating rotary hammers and other vibrating equipment
Kevlar or Wire mesh	Work with sheet metal, glass, or heavy cutting These gloves Do Not provide puncture protection
Rubber, nitrile, neoprene, PVC, PVA and other synthetics	Chemical gloves must be chosen for the specific chemical being used
Insulated	Extreme high and low temperatures

Body Protection: What are some of the causes of body injuries?

- Intense heat
- Splashes of hot metals and other hot liquids
- Impacts from tools, machinery, and materials
- Cuts
- Hazardous chemicals
- Contact with potentially infectious materials, like blood
- Radiation

Type of Body Protection Equipment

➤ Cooling Vest



➤ Sleeves and Apron



➤ Full Body Suit



➤ Coveralls



Summary

Employers must implement a PPE program where they:

- Conduct a risk analysis for the workplace for likely hazards at the workplace
- Use engineering and work practice controls to eliminate or reduce hazards before using PPE
- Right PPEs must be provided to the employees free of cost (exceptions apply)
- Educate the employees about the importance of the PPE program and how and when to use PPE
- Train employees how to use and care for their PPE and how to recognize deterioration and failure
- Employees are required to wear the PPEs as recommended by the supervisor

References

- OSHA Office of Training and Education

Acknowledge Training

[Click here to acknowledge receipt of training](#)

– If you have any questions contact:

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