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

- No. 1: Engineering Controls
- No. 2: Administrative Controls
- No. 3 PPE
Hierarchy of Control Measures

1. Engineering Controls
   Most Effective Control

2. Administrative Controls

2. Personal Protective Equipment
   Least Effective Control
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

- Eye - 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 of the 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

- Safety cap
- Rib
- + Peak
- Headband
- Suspension band
- Neck strap
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

Class G (formerly Class A)¹
- General service (e.g., mining, building construction, shipbuilding, lumbering, and manufacturing)
- Good impact protection but limited voltage protection

Class E (formerly Class B)¹
- Electrical work
- Protect against falling objects, high-voltage shock/burns

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

¹ Per ANSI Z89.1-1997
Hearing Protection

SAVE YOUR HEARING
Examples of Hearing Protectors

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

**Earplugs**
foam ear plugs to fit ear canals of different sizes.

**Canal Caps**
provide less protection than ear muffs or plugs,
Foot Protection
## Type of Foot Injuries and Common Causes

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

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

- Natural Rubber
- Polyvinyl Alcohol (PVC)
- Nitrile
- Butyl
- Viton

- Norfoil
- Wire mesh
- Kevlar
- Welding
- Leather
- Anti-vibration
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?

<table>
<thead>
<tr>
<th>Glove</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton</td>
<td>Light duty material handling and cleanup work</td>
</tr>
<tr>
<td>Leather</td>
<td>Equipment handling, general construction, heavy cleanup, welding, moderately hot or cold material handling</td>
</tr>
<tr>
<td>Shock absorbing</td>
<td>Operating rotary hammers and other vibrating equipment</td>
</tr>
<tr>
<td>Kevlar or Wire mesh</td>
<td>Work with sheet metal, glass, or heavy cutting</td>
</tr>
<tr>
<td></td>
<td>These gloves Do Not provide puncture protection</td>
</tr>
<tr>
<td>Rubber, nitrile, neoprene, PVC, PVA and other synthetics</td>
<td>Chemical gloves must be chosen for the specific chemical being used</td>
</tr>
</tbody>
</table>
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
Body Protection cont.

Coveralls

Full Body Suit
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