Personal Protective Equipment

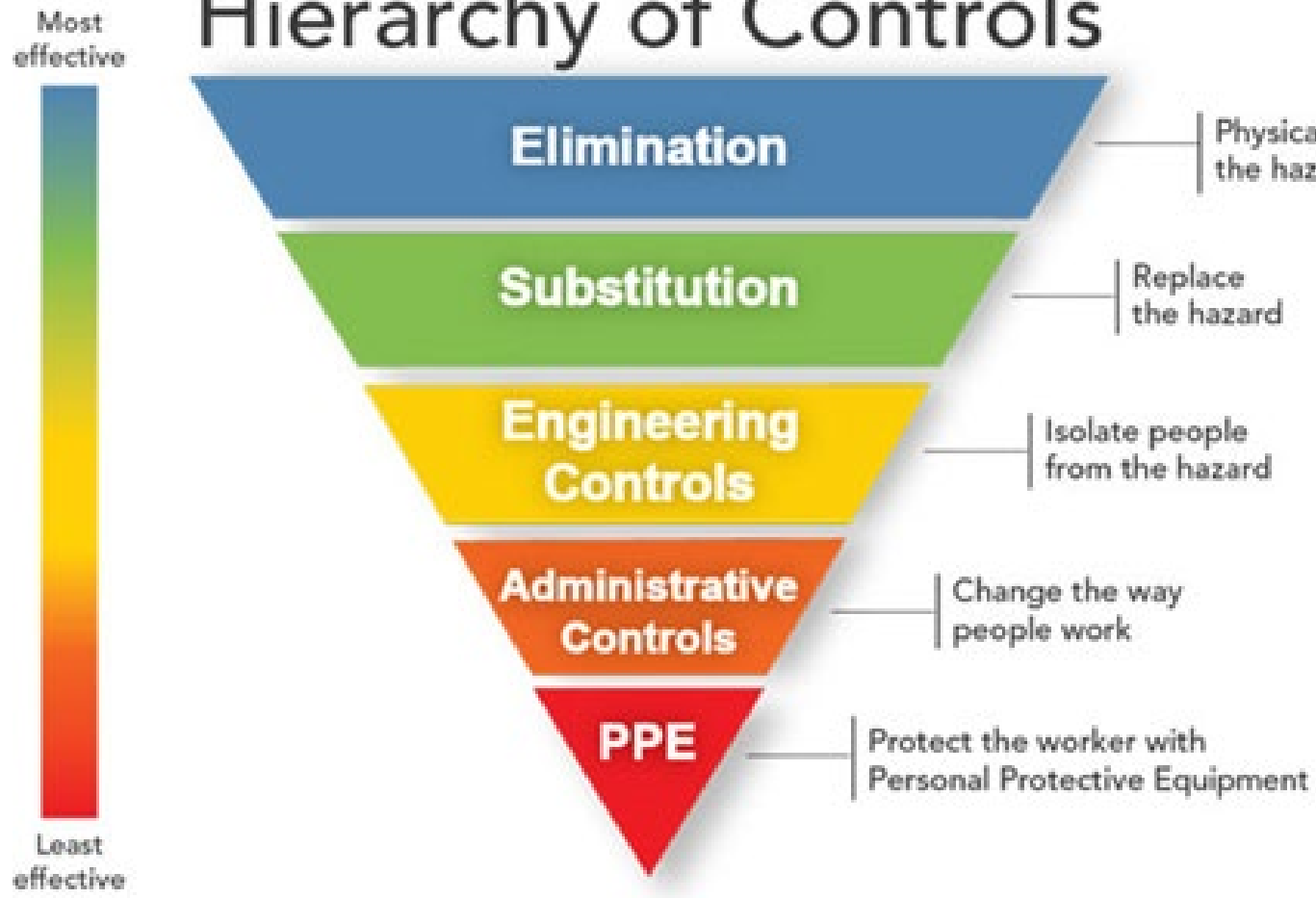
Developed by the EH&S Office

Protecting Employees from Workplace Hazards

- Employers must protect employees from workplace hazards such as machines, hazardous substances, and dangerous work procedures that can cause injury
- Employers must:
  - Use all feasible engineering and work practice controls to eliminate and reduce hazards
  - Then use appropriate personal protective equipment (PPE) if these controls do not eliminate the hazards

Remember, PPE is the last level of control

Hierarchy of Controls



Engineering Controls

IF…

The machine or work environment can be physically changed to prevent employee exposure to the potential hazard

THEN…

The hazard can be eliminated with an engineering control

Engineering Controls (cont'd)

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

Work Practice Controls

If…

Employees can be removed from exposure to the potential hazard by changing the way they do their jobs,

Then…

The hazard can be eliminated with a work practice control.

Work Practice Controls (cont'd)

- 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: vest
- Hearing: earplugs, earmuffs

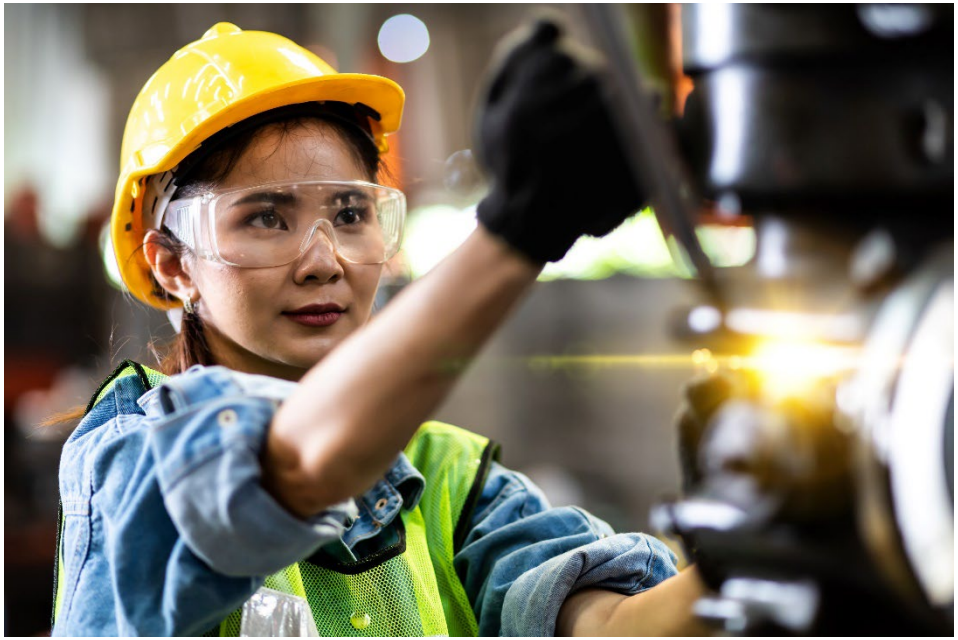
Establishing a PPE Program

- Sets out procedures for selecting, providing and using PPE as part of an employer's routine operation
- First– assess the workplace to determine if hazards are present, or are likely to be present, which necessitates 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 eh 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

Eye Protection

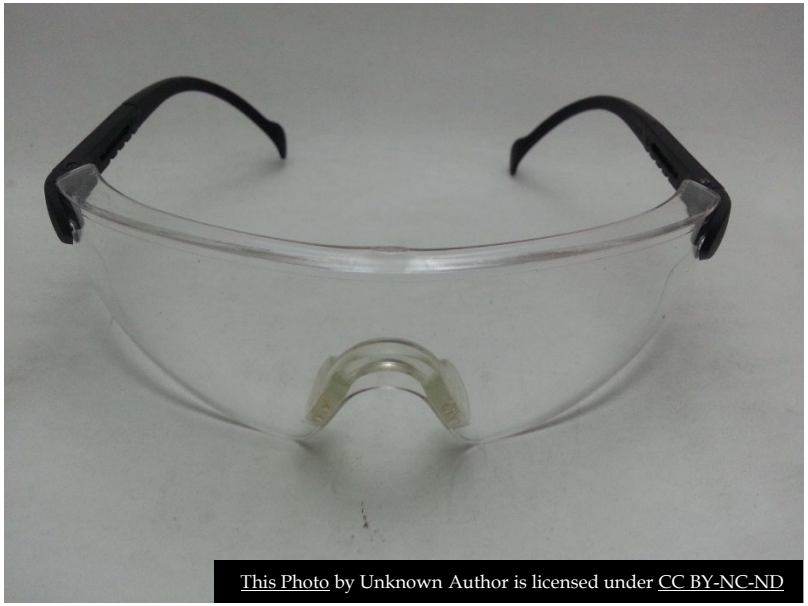


What are some of the causes of eye injuries?

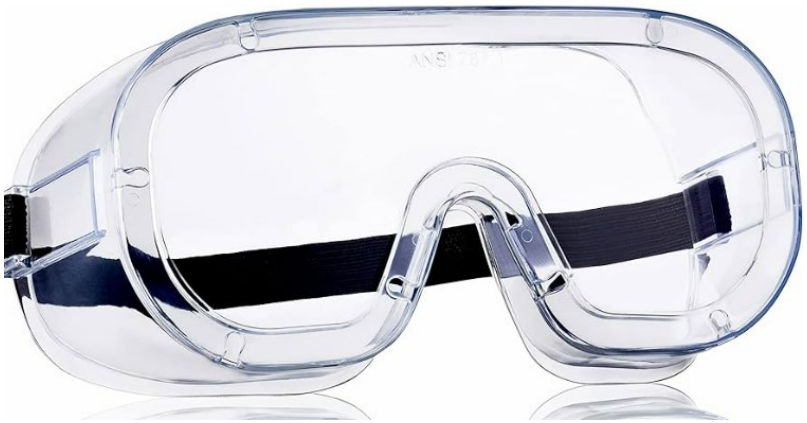
- Dust and other flying particles, such as metal shavings or sawdust
- Molten metal that might splash
- Acids and other caustic liquid chemicals that might splash
- Blood and other potentially infectious body fluids that might splash, spray, or splatter
- Intense light such as that created by welding and lasers

Safety Glasses

- 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



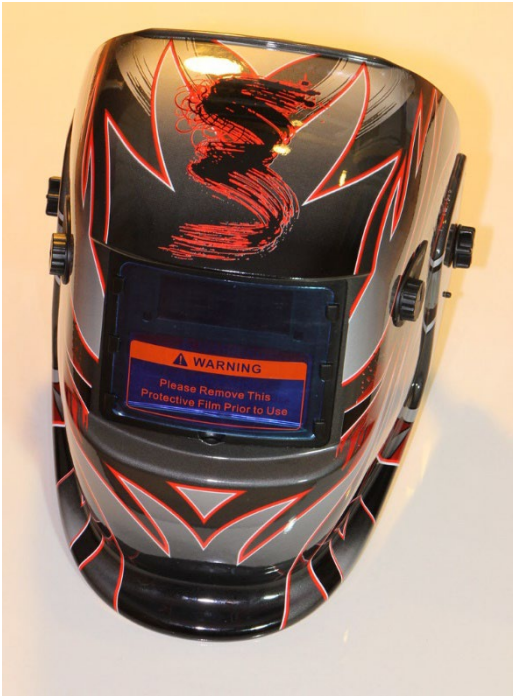
Goggles

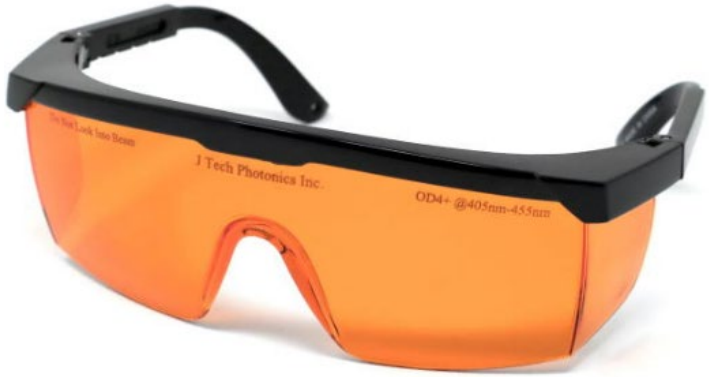


- Protect eyes, eye sockets, and the facial area immediately surrounding the eyes from impact, dust, and splashes.
- Some goggles fit over corrective lenses

Welding Shields

- Protect eyes from burns caused by infrared or intense radiant light, and protect face and eyes from flying sparks, metal splatter, and slag chips produced during welding, brazing, soldering, and cutting



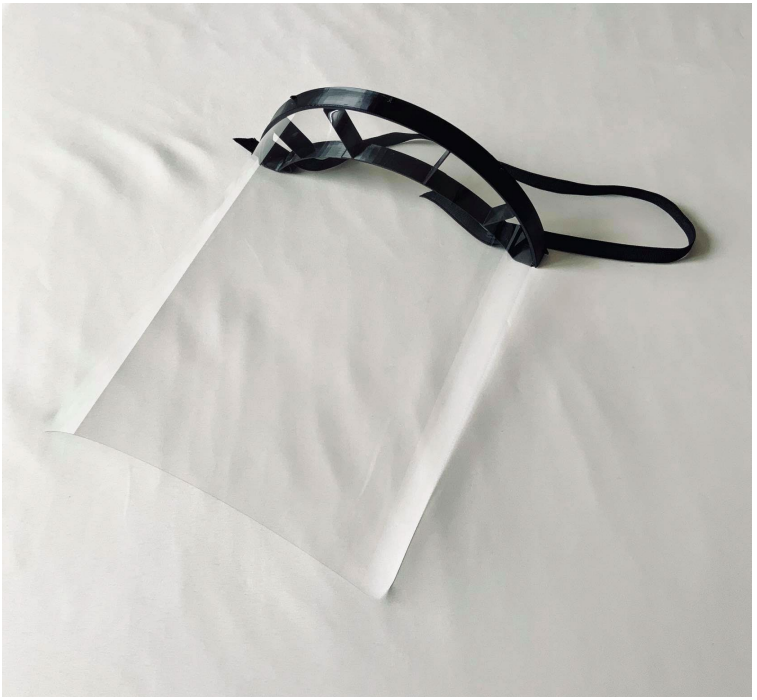


Laser Safety Goggles

Protects eyes from intense concentrations of light produced by lasers.

Face Shields

- Protect the face from nuisance dusts and potential splashes or sprays of hazardous liquids
- Do not protect employees from impact hazards



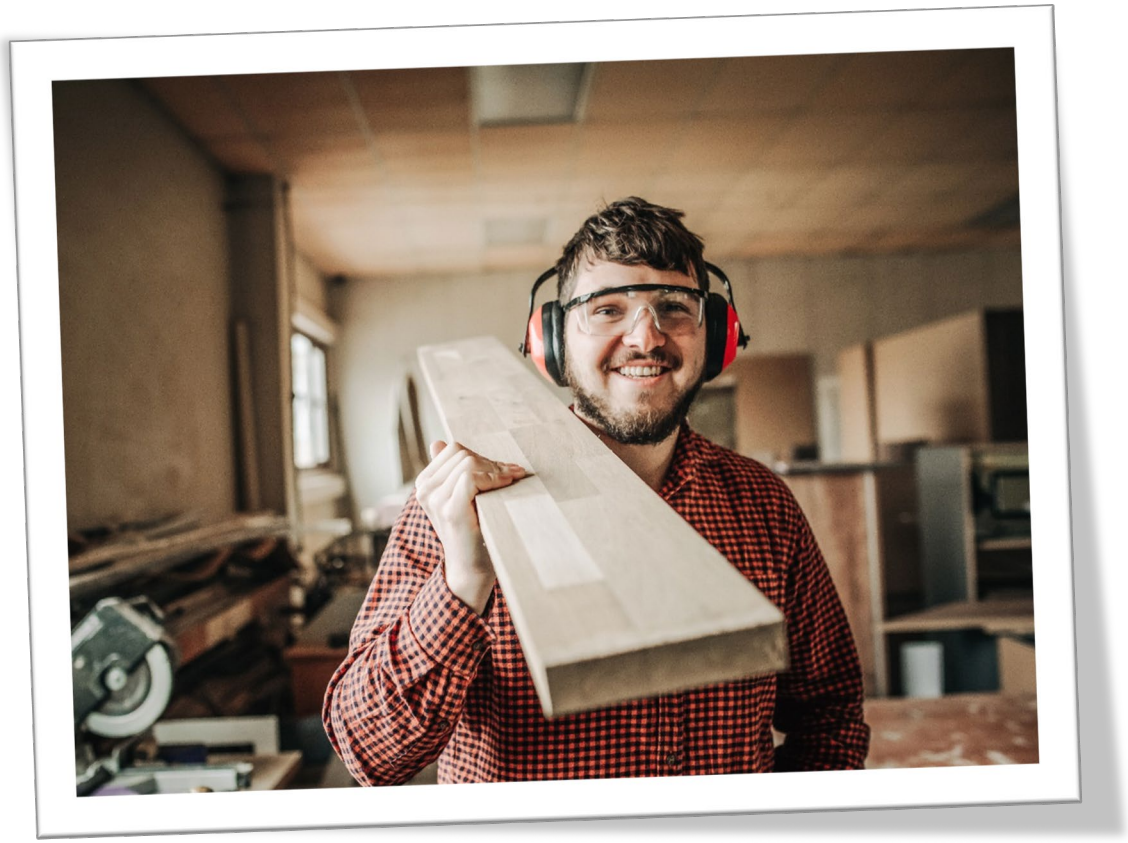
Head Protection

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

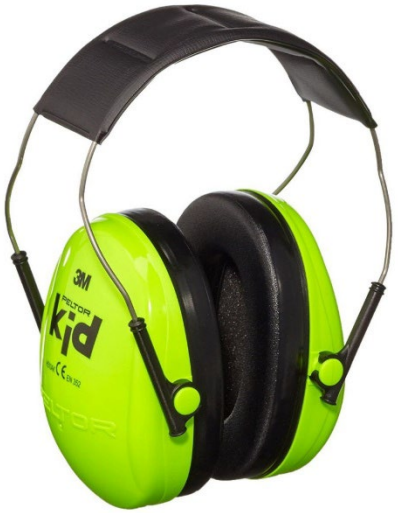
Classes of Hard Hats

- **Class A**
  - General service (e.g., mining, building construction, shipbuilding, lumbering, and manufacturing)
  - Good impact protection but limited voltage protection
- **Class B**
  - Electrical work
  - Protect against falling objects and high-voltage shock and 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

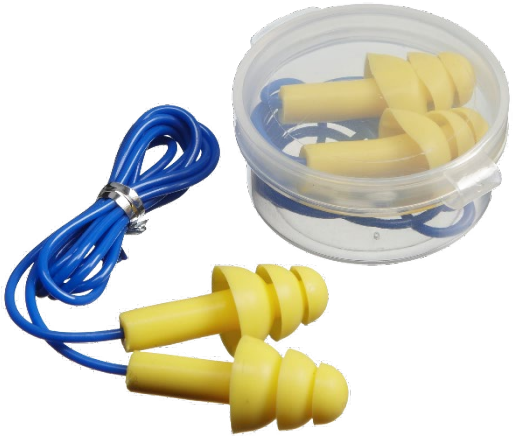


Hearing protection

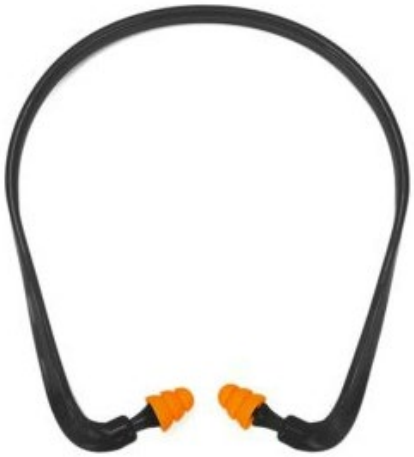
Examples of Hearing Protection



Earmuffs

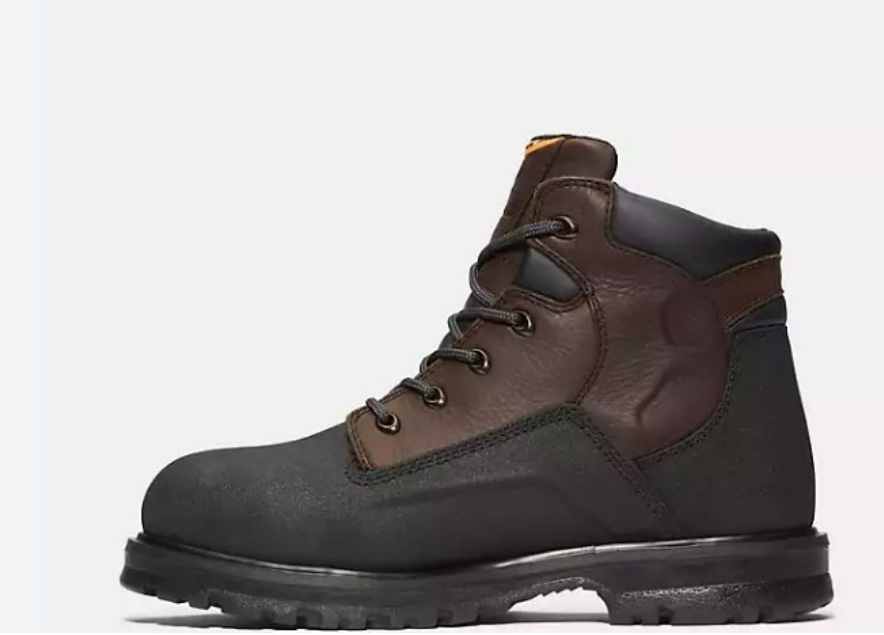


Earplugs



Canal Caps

Foot Protection



Causes of Foot Injuries

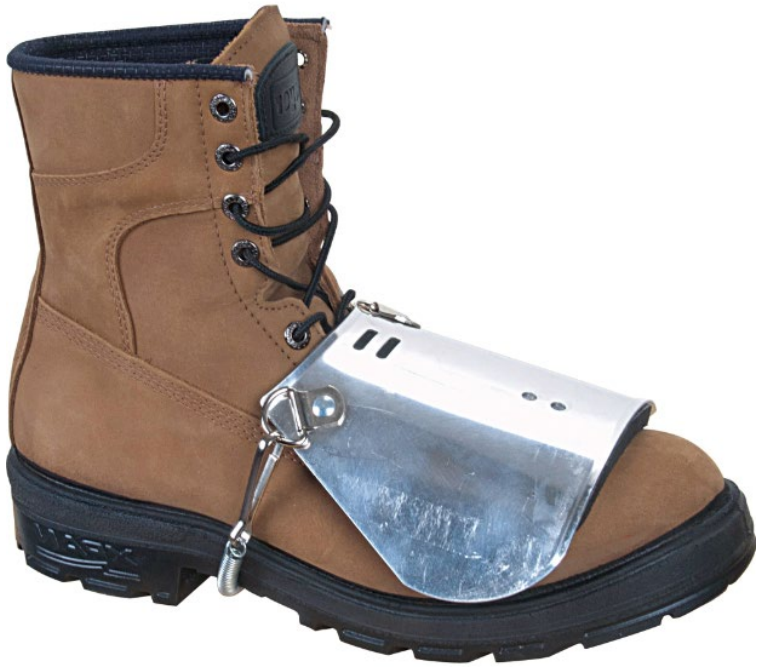
- Heavy objects such as barrels or tools that might roll onto or fall on employees' feet
- Sharp objects such as nails or spikes that might pierce the soles or uppers of ordinary shoes
- Molten metal that might splash on feet
- Hot or wet surfaces
- Slippery surfaces

Safety Shoes

- Have impact-resistant toes and heat-resistant soles that protect against hot surfaces common in roofing, paving, and hot metal industries
- Some have 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

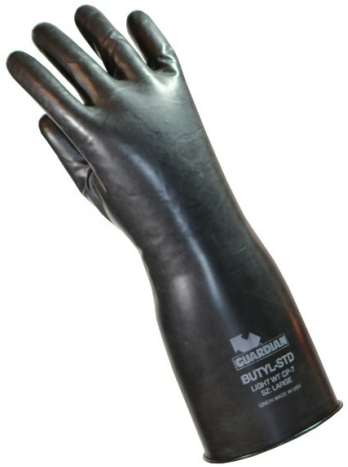
Types of Hand Injuries to guard against

- Burns
- Bruises
- Abrasions
- Cuts
- Punctures
- Fractures
- Amputations
- Chemical Exposures

Types of Gloves

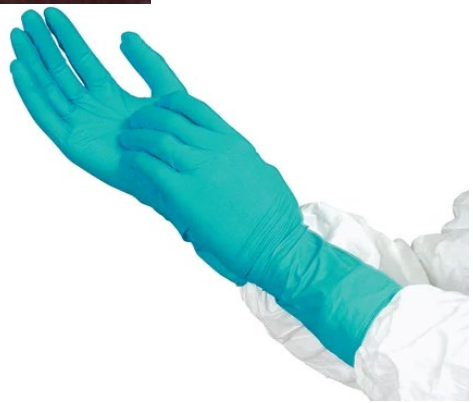
- *Norfoil* laminate resists permeation and breakthrough of an array of toxic/hazardous chemicals

- *Butyl* provides the highest permeation to gas or water vapors; frequently used for ketones (M.E.K., Acetone and esters (Amyl Acetate, Ethyl Acetate)



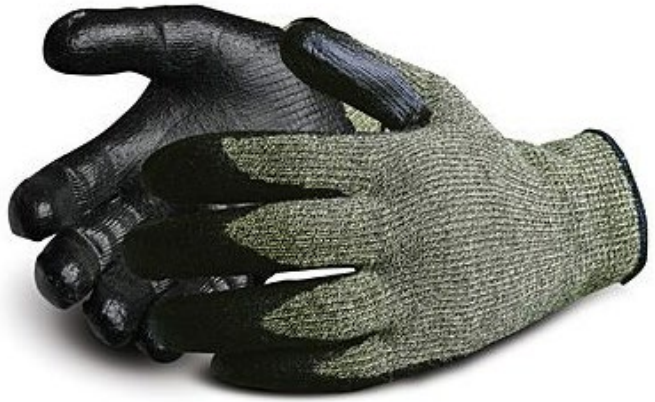
Types of Gloves (cont'd)

- *Viton* is highly resistant to permeation by chlorinated and aromatic solvents
- *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

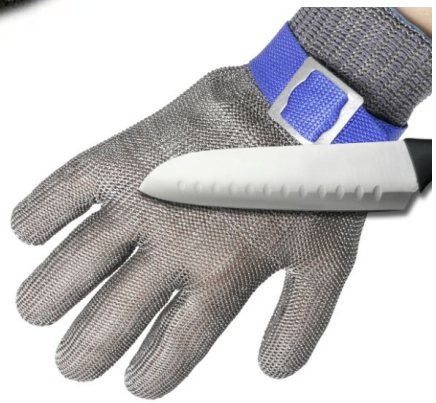


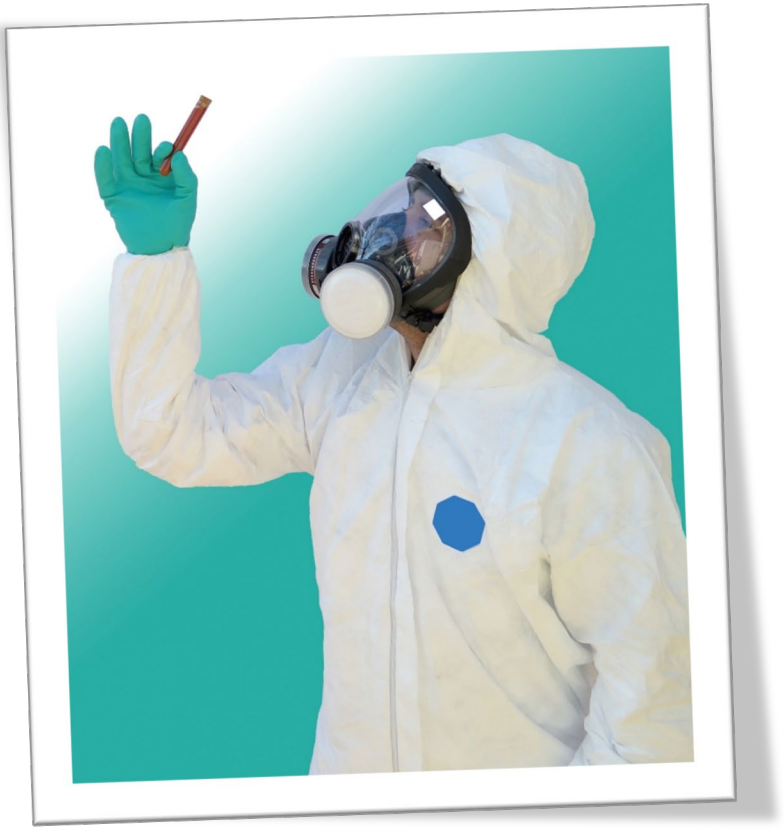
Types of Gloves (cont'd)

- *Kevlar* protects against cuts, slashes, and abrasion



- *Stainless steel mesh* protects against cuts and lacerations





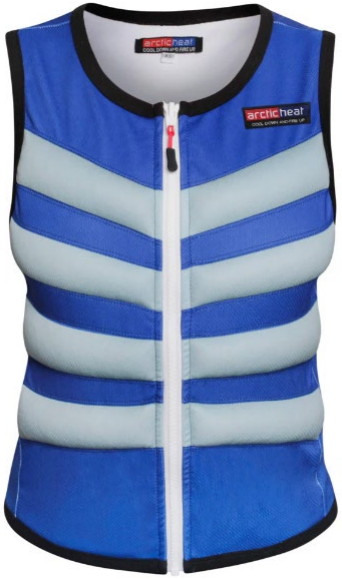
Body Protection

Causes of body injuries

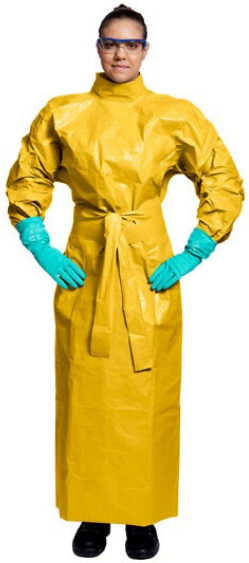
- Intense heat
- Splashes of hot metals and other hot liquids
- Impacts from tools, machinery, and materials
- Cuts
- Hazardous chemicals
- Contact with potentially infections materials, like blood
- Radiation

Body Protection

- Cooling mechanisms

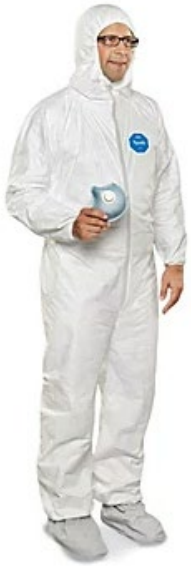


- Sleeves and Apron

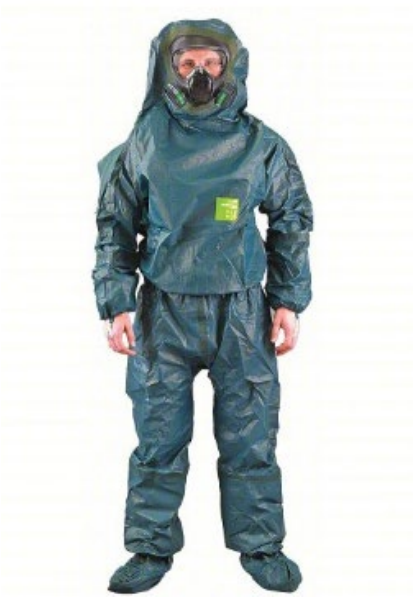


Body Protection

- Coveralls



- Full body Suit



Summary

Employers must implement a PPE Program where they:

- Assess the workplace for hazards
- Use engineering and work practice controls to eliminate or reduce hazards before using PPE
- Select appropriate PPE to protect employees from hazards that cannot be eliminated
- Inform employees why the PPE is necessary and when it must be worn
- Train employees how to use and care for their PPR and how to recognize deterioration and failure
- Require employees to wear selected PPE in the workplace