

# Personal Protective Equipment



# Protecting Employees from Workplace Hazards

- Employers must protect employees from hazards such as falling objects, harmful substances, and noise exposures that can cause injury
- Employers must:
  - Use all feasible engineering and work practice controls to eliminate and reduce hazards
  - Use personal protective equipment (PPE) if the controls don't eliminate the hazards.
- PPE is the last level of control!

# Payment 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

# Engineering Controls

*If . . .*

The 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

## *Examples . . .*

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

# Work Practice Controls

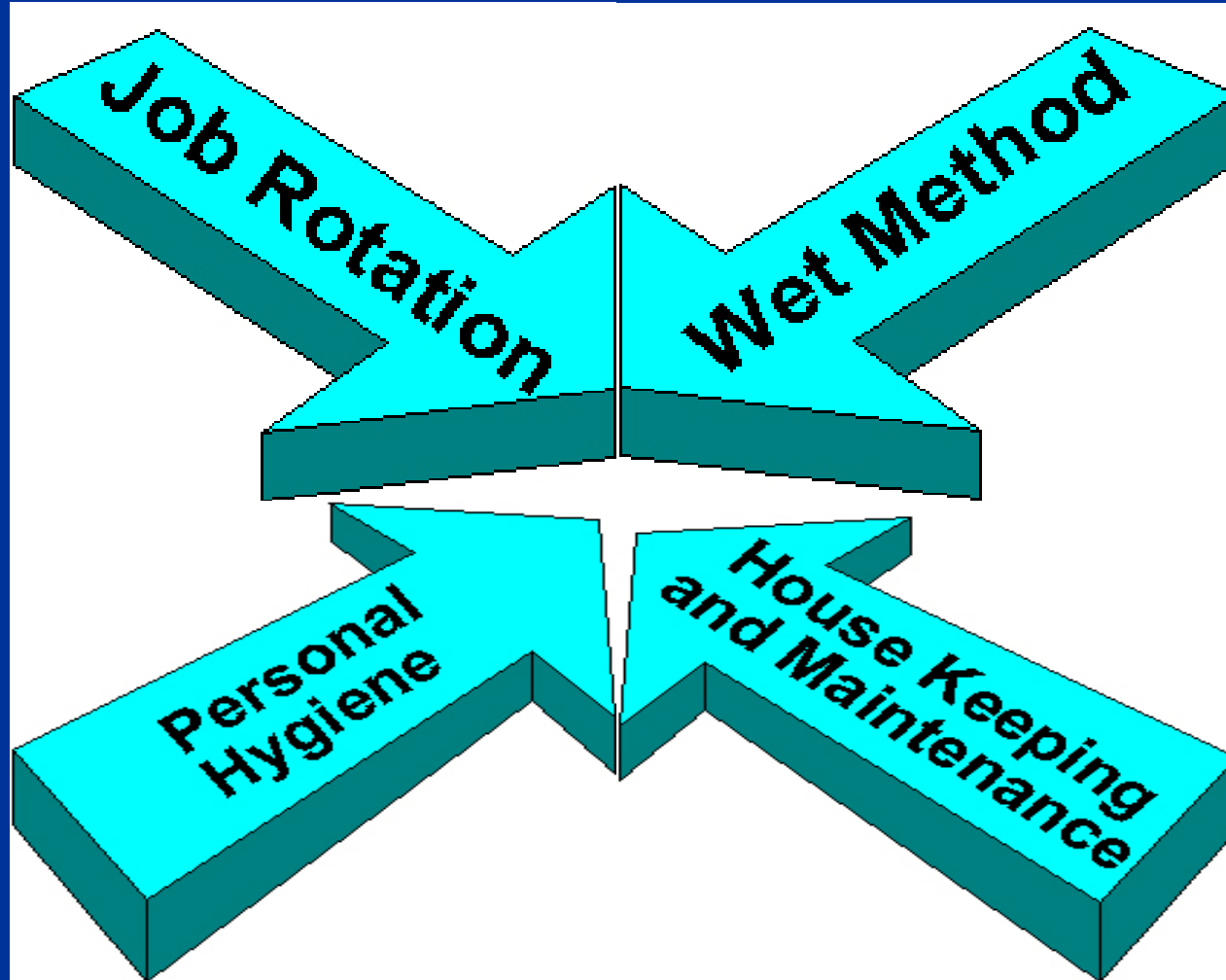
*If . . .*

Employees can change the way they do their jobs and the exposure to the potential hazard is removed,

*Then . . .*

The hazard can be eliminated with a work practice control

# Work Practice Controls -- Examples



# Responsibilities

- **Employer**

- Assess workplace for hazards
- Provide PPE
- Determine when to use
- Provide PPE training for employees and instruction in proper use

- **Employee**

- Use PPE in accordance with training received and other instructions
- Inspect daily and maintain in a clean and reliable condition



# Examples of PPE

<b>Body Part</b>	<b>Protection</b>
<b>Eye</b>	<b>safety glasses, goggles</b>
<b>Face</b>	<b>face shields</b>
<b>Head</b>	<b>hard hats</b>
<b>Feet</b>	<b>safety shoes</b>
<b>Hands and arms</b>	<b>gloves</b>
<b>Bodies</b>	<b>vests</b>
<b>Hearing</b>	<b>earplugs, earmuffs</b>

# PPE Program

- Includes procedures for selecting, providing and using PPE
- First -- assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of PPE
- After selecting PPE, provide training to employees who are required to use it

# Training

If employees are required to use PPE, train them:

- Why it is necessary
- How it will protect them
- What are its limitations
- When and how to wear
- How to identify signs of wear
- How to clean and disinfect
- What is its useful life & how is it disposed



# Head Protection



# Classes of Hard Hats

## Class G (formerly Class A)<sup>1</sup>

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

## Class E (formerly Class B)<sup>1</sup>

- 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

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<sup>1</sup> Per ANSI Z89.1-1997

# Selecting the Right Hard Hat

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# Eye Protection



# When Must Eye Protection be Provided?

When any of these hazards are present:

- Dust and other flying particles, such as metal shavings or sawdust
- Corrosive gases, vapors, and liquids
- Molten metal that may splash
- Potentially infectious materials such as blood or hazardous liquid chemicals that may splash
- Intense light from welding and lasers



# **Eye Protection**

## **Criteria for Selection**

- **Protects against specific hazard(s)**
- **Comfortable to wear**
- **Does not restrict vision or movement**
- **Durable and easy to clean and disinfect**
- **Does not interfere with the function of other required PPE**

# Eye Protection for Employees Who Wear Eyeglasses

Ordinary glasses do *not* provide the required protection

Proper choices include:

- Prescription glasses with side shields and protective lenses
- Goggles that fit comfortably over corrective glasses without disturbing the glasses
- Goggles that incorporate corrective lenses mounted behind protective lenses

# Safety Glasses

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



# Goggles

- Protects eyes and area around the eyes from impact, dust, and splashes
- Some goggles fit over corrective lenses



# Laser (Welding) Safety Goggles

Protects eyes from intense concentrations of light produced by lasers



# Face Shields

- Full face protection
- Protects face from dusts and splashes or sprays of hazardous liquids
- Does not protect from impact hazards
- Wear safety glasses or goggles underneath



# Welding Shields

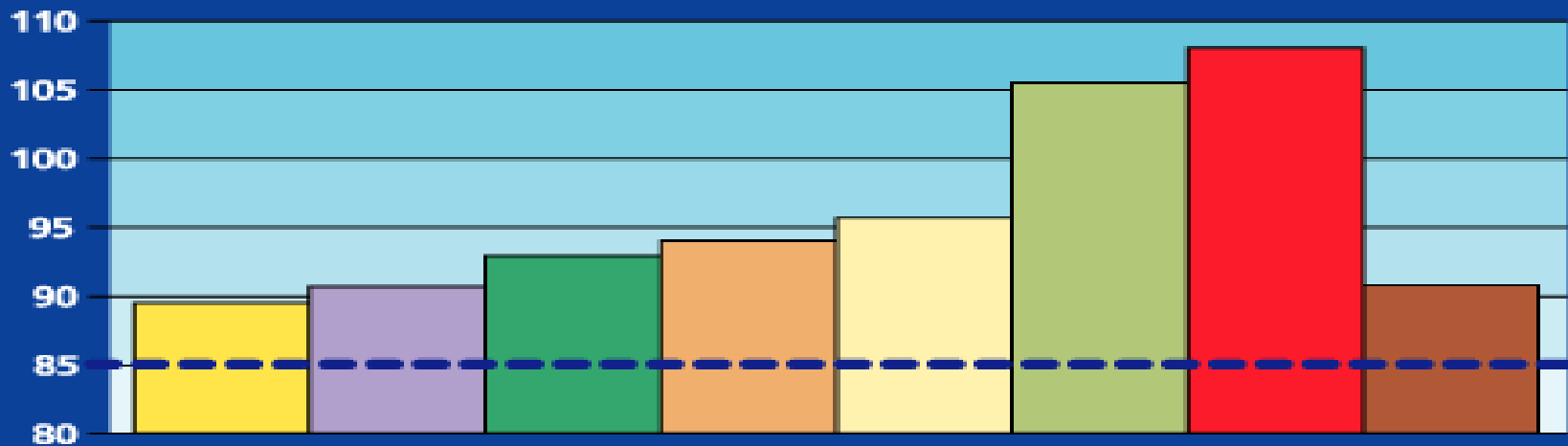
Protects eyes against burns from radiant light

Protects face and eyes from flying sparks, metal spatter, & slag chips produced during welding, brazing, soldering, and cutting



# Hearing Protection

Graph 1: Average dB(A) For Some Construction Trades / Activities





# Hearing Protection

When it's not feasible to reduce the noise or its duration – use ear protective devices

Ear protective devices must be fitted

	DECIBEL - dB(A)	EQUIPMENT
Double protection recommended above 105 dB(A)	112	Pile driver
	110	Air arcing gouging
	108	Impact wrench
	107	Bulldozer - no muffle
	102-104	Air grinder
	102	Crane - uninsulated cab
	101-103	Bulldozer - no cab
	97	Chipping concrete
	96	Circular saw and hammering
	96	Jack hammer
Hearing protection recommended above 85 dB(A)	96	Quick-cut saw
	95	Masonry saw
	94	Compactor - no cab
	90	Crane - insulated cab
	87	Loader/backhoe - insulated cab
	86	Grinder
	85-90	Welding machine
	85	Bulldozer - insulated cab
	60-70	Speaking voice

Table 1: Some typical noise levels found on construction sites

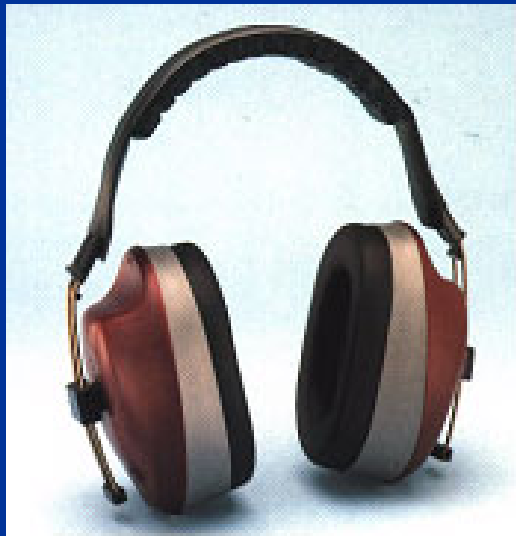
# **When Must Hearing Protection be Provided?**

**After implementing engineering and  
work practice controls**

**When an employee's noise exposure  
exceeds an 8-hour time-weighted  
average (TWA) sound level of 90 dBA**

# Examples of Hearing Protectors

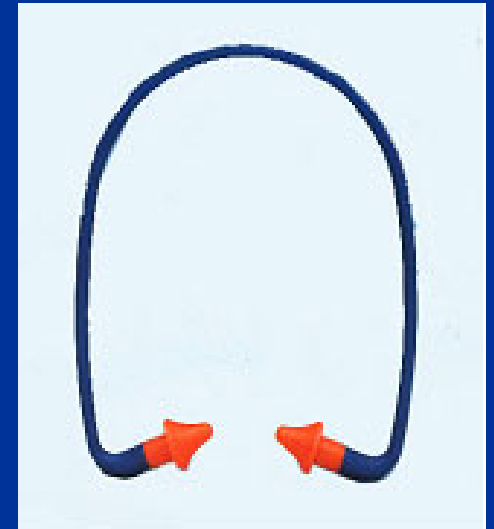
**Earmuffs**



**Earplugs**



**Canal Caps**



# Foot Protection



# When Must Foot Protection be Provided?

When any of these are present:

- 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 ordinary shoes
- Molten metal that might splash on feet
- Hot or wet surfaces
- Slippery surfaces

# Safety Shoes

- **Impact-resistant toes and heat-resistant soles protect against hot surfaces common in roofing and paving**
- **Some have metal insoles to protect against puncture wounds**
- **May be electrically conductive for use in explosive atmospheres, or nonconductive to protect from workplace electrical hazards**



# Hand Protection



# When Must Hand Protection be Provided?

When any of these are present:

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

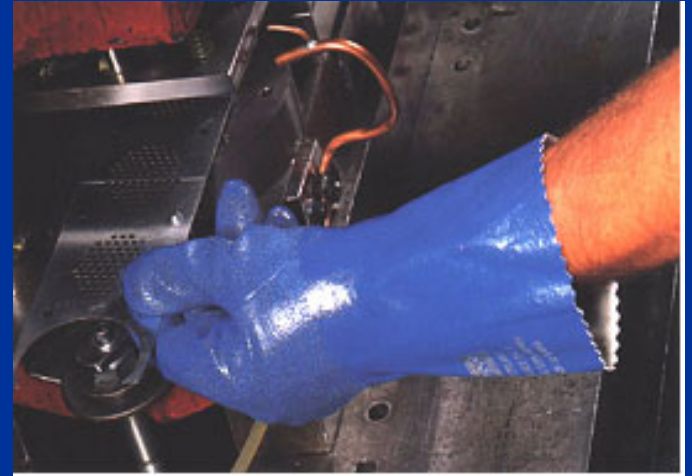


# What Kinds of Protective Gloves are Available?

Types of Gloves	Protection
Durable - made of metal mesh, leather, or canvas	Cuts, burns, heat
Fabric & coated fabric	Dirt and abrasion
Chemical and liquid resistant	Burns, irritation, and dermatitis
Rubber	Cuts, lacerations, and abrasions

# Types of Rubber Gloves

***Nitrile*** protects against solvents, harsh chemicals, fats and petroleum products and also provides excellent resistance to cuts and abrasions.



***Butyl*** provides the highest permeation resistance to gas or water vapors



# Other Types of Gloves

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



***Stainless steel mesh*** protects against cuts and lacerations



# Body Protection



# Major Causes of Body Injuries

- Intense heat
- Splashes of hot metals and other hot liquids
- Impacts from tools, machinery, and materials
- Cuts
- Hazardous chemicals
- Radiation

# Body Protection

## Criteria for Selection

- Provide protective clothing for parts of the body exposed to possible injury
- Types of body protection:
  - Vests
  - Aprons
  - Jackets
  - Coveralls
  - Full body suits



**Coveralls**

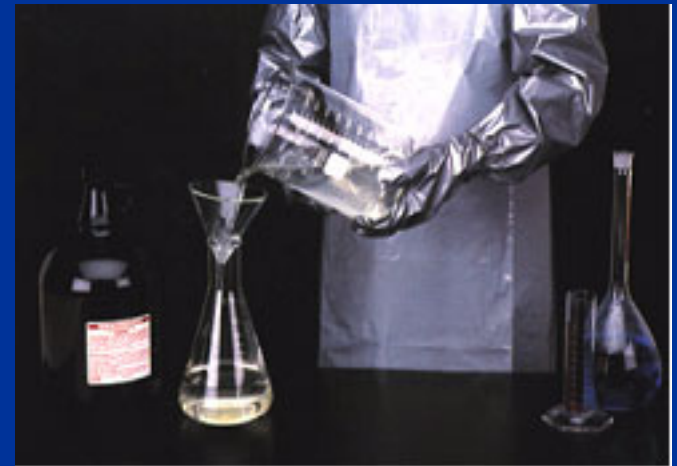
# Body Protection



**Cooling Vest**



**Full Body Suit**



**Sleeves and Apron**

# 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, how and when it must be worn**
- **Train employees how to use and care for their PPE, including how to recognize deterioration and failure**
- **Require employees to wear selected PPE**