

**Lesson:** Personal Protective Equipment

- Lesson Objectives:**
- Identify the types of hazards requiring PPE including impact, penetration, compression, chemical/harmful dust, temperature, light/radiation, noise, and electrical
  - List the types of PPE
  - Describe why you must wear PPE
  - Distinguish typical hazards and types of protection devices for each type of PPE
  - Explain how to properly care for and use:
    - Head Protection
    - Hearing Protection
    - Hand Protection
    - Eye protection
    - Foot Protection
    - Protective Clothing
    - Respiratory Protection

- Topics:**
- The types of hazards requiring PPE
  - The types of PPE
  - Head Protection
  - Hearing Protection
  - Hand Protection
  - Eye protection
  - Foot Protection
  - Protective Clothing
  - Respiratory Protection

**Topic: The types of hazards requiring PPE**

You first need to identify the type of hazards before you can select the appropriate PPE. Every job on the construction site has unique characteristics and, therefore, different hazards.

Two main categories of hazards are physical hazards and health hazards. The types of hazards that fall under these categories are impact, penetration, compression, chemical/harmful dust, temperature, light/radiation, noise, and electrical.

Having completed this topic, you should be able to:

- Identify the categories and types of hazards.
- State the most common citations issued by OSHA for violations of the PPE standards.

Topic summary:

Please take a moment to review these points before you continue with the next topic.

- The two distinct categories of hazards are:
  - Physical hazards: Bodily harm results from contact with the hazardous agent
  - Health hazards: Sickness or disease results from exposure to the hazardous agent
  
- OSHA organizes workplace hazards into the following types:
  - Impact hazards: Various tools, equipment, materials, or the work environment itself; stacked or suspended materials
  - Penetration hazards: Falling objects with a sharp edge or point
  - Compression hazards: Machinery or processes that have the potential for compressing anything
  - Hazards from chemical/harmful dust: The use of solvents, adhesives, or gases; the creation of fumes and dusts
  - Temperature hazards: Excessive temperatures, handling hot or cold materials, performing hot work such as welding, or the potential for fire
  - Light/radiation hazards: Welding, cutting, or brazing
  - Noise hazards: Exposing the ear to high levels of noise
  - Electrical hazards: Temporary power, extension cords, and faulty wiring
  
- The largest number of violations occurred in head protection. The next largest number of violations occurred in eye and face protection, PPE provided, used, and maintained, safety nets for falls over 25 feet, and life jackets/vests.

**Topic: The types of PPE**

In this topic you read about the types of PPE you must wear based on the hazard assessment your employer has provided. You also learned the reasons for wearing PPE. Having completed this topic, you should be able to:

- List the types of PPE
- Describe why you must wear PPE

Topic summary:

Please take a moment to review these points before you continue with the next topic.

The types of PPE covered in this topic include:

- Head protection equipment (hardhats)
- Hearing protection equipment (earplugs, ear caps, earmuffs)
- Hand protection equipment (gloves)
- Eye protection equipment (safety glasses, safety goggles, face shields, welding helmets)
- Foot protection equipment (safety shoes and boots)
- Protective clothing equipment (special vests, aprons, jackets)

- Respiratory protection equipment (respirators)

### **Topic: Head Protection**

Prevention of head injuries is an important factor in every safety program. A survey by the Bureau of Labor Statistics (BLS) of incidents and injuries notes that most workers who suffered impact injuries to the head were not wearing head protection. The majority of workers were injured while performing their normal jobs at their regular worksites.

In this topic, you learned about head protection in detail. Having completed this topic, you should be able to:

- Summarize typical hazards requiring head protection equipment
- Explain types of head protection devices
- Use and care for head protection equipment

#### Topic summary:

Please take a moment to review these points before you continue with the next topic.

- The device to be worn to protect your head is a hardhat. The material, shape, and condition of the outer shell and the suspension system inside the hardhat are all designed to protect the head from impact, penetration, and electrical shock.
- Hardhats should have the following information inside them:
  - The manufacturer's name
  - The legend, "ANSI Z89.1"
  - The class designation (A, B, or C)
- To ensure that your hardhat will function properly in the event of an incident at the worksite, you should adhere to the following guidelines:
  - NEVER paint the hardhat or apply stickers to it.
  - NEVER use a hardhat that appears damaged.
  - NEVER store or carry hardhats in the rear window of an automobile.
  - NEVER drill holes in the hardhat.

### **Topic: Hearing Protection**

In this topic you learned about hearing protection. Work-related hearing loss continues to be a critical workplace safety and health issue. The National Institute for Occupational Safety and Health (NIOSH) and the occupational safety and health community named hearing loss one of the 21 priority areas for research in the next century. Noise-induced hearing loss is 100 percent preventable but once acquired, hearing loss is permanent and irreversible. Therefore, prevention measures must be taken by employers and workers to ensure the protection of workers' hearing. OSHA requires a hearing conservation program to protect workers from hazardous exposures to noise.

Having completed this topic, you should be able to:

- Summarize typical hazards requiring hearing protection equipment

- Describe types of hearing protection devices
- Use and care for hearing protection equipment

Topic summary:

Please take a moment to review these points before you continue with the next topic.

- If the noise exceeds 90dB during the work shift, hearing protection is required to prevent permanent damage to the ears.
- The following types of hearing protection devices are used most commonly on construction sites:
  - Earplugs: Earplugs are made of soft, pliable material that is designed to protect your ear from noise hazards by fitting into and sealing the ear canal.
  - Ear Caps: Ear caps are small, soft pods, pads, or flexible tips that seal the ear at or near the entrance to the ear canal with only a minimal amount of insertion.
  - Earmuffs: Earmuffs are noise-attenuating cups with soft cushions and a connecting band that are worn around the outer ear to seal out noise. Earmuffs are most popular in applications where there is a need to remove and replace the hearing protection device frequently.
- You should:
  - Inspect hearing protection before each use.
  - Wash hands thoroughly before inserting or putting on hearing protection.
  - Clean hearing protection devices regularly using warm, soapy water and following manufacturers recommendations. Do not use alcohol, acetone, or other chemicals.
  - Store hearing protection devices where they will stay clean and dry.

**Topic: Hand protection**

You learned about hearing protection in the previous topic. In this topic you learned hand protection. On every construction site, fingers and hands are exposed to cuts, scratches, bruises, and burns. Although it is difficult to protect your fingers completely, because you need them for practically every construction operation, you can shield them from common injuries with the proper protective equipment.

Having completed this topic, you should be able to:

- Summarize typical hazards requiring hand protection equipment
- Explain the types of hand protection devices
- Use and care for hand protection equipment

Topic summary:

Please take a moment to review these points before you continue with the next topic.

- There are many types of gloves to protect your hands from many types of hazards.
- The following are the most common types found in the construction industry:
  - Heat-resistant gloves
  - Metal mesh gloves
  - Rubber gloves

- Neoprene and vinyl gloves
  - Leather gloves
  - Cotton fabric gloves
- Use the following guidelines to protect your hands:
  - Match the type of glove with the hazard it must protect against.
  - Check for holes, scratches, and cracks.
  - Check the color of the glove.
  - Check the elasticity of the glove.
  - Check the thickness of the glove.
  - Make sure the glove fits properly.

### **Topic: Eye protection**

You learned about hand protection in the previous topic. In this topic you learned about eye protection in detail. OSHA requires that workers be protected from hazards to the eyes by wearing eye protection where there is a hazard of flying particles, chemicals, or potentially dangerous light radiation.

Having completed this topic, you should be able to:

- Summarize typical hazards requiring eye protection equipment
- Explain types of eye protection devices
- Use and care for eye protection equipment

#### Topic summary:

Please take a moment to review these points before you continue with the next topic.

- Eye protection should protect you from:
  - Flying particles
  - Molten metal
  - Liquid chemicals
  - Acid and caustic substances
  - Chemical gases or vapors
  - Light ray radiation
- There are four types of eye and face protection devices:
  - Safety glasses (primary protectors)
  - Safety goggles (primary protectors)
  - Face shields (secondary protectors)
  - Welding helmets (secondary protectors)
- Eye protection should be properly cared for and stored in a location that keeps it free from being scratched, soiled, or exposed to hazardous elements (sun or chemicals).

### **Topic: Foot Protection**

You learned about eye protection in the previous topic. In this topic you learned about foot protection in detail. The OSHA construction standards depend on ANSI Z41, "American National Standard for Personal Protection-Protective Footwear," to provide the specification for footwear. Footwear that is selected based on the hazards present, and which has ANSI approval, will comply with the OSHA standard.

Having completed this topic, you should be able to:

- Summarize typical hazards requiring foot protection equipment
- Describe types of foot protection devices
- Use and care for foot protection equipment

Topic summary:

Please take a moment to review these points before you continue with the next topic.

- The hazard most frequently thought of when safety shoes are mentioned is heavy objects that fall or roll over the foot.
- There are many types of footwear to protect you from a variety of hazards at your job site:
  - Electrical hazard shoes
  - Slip-resistant shoes
  - Other protective footwear (such as metatarsal and shin guards)
  - Safety boots (neoprene or nitrile boots, foundry or "Gaiter" style boots)

**Topic: Protective Clothing**

You learned about foot protection in the previous topic. In this topic, you learned about protective clothing in detail. Defining personal protective clothing is a difficult task. The OSHA construction standards do not provide detailed requirements on personal protective clothing. However, failure to mandate that employees wear shirts with long sleeves during certain operations has been cited as a violation. For the purpose of this topic, protective clothing will refer to full-body chemical protective suits and clothing or protective wear that covers the general area of the torso.

Having completed this topic, you should be able to:

- Summarize typical hazards requiring protective clothing
- Describe types of protective clothing
- Use and care for protective clothing

Topic summary:

Please take a moment to review these points before you continue with the next topic.

- Contracts with chemical plants, refineries, or other hazardous chemical processes can involve potential exposure to chemicals that may splash onto all parts of the body.
- Protective devices include:

- Special vests (night workers and flagmen)
- Aprons (sparks and molten metal, welders)
- Jackets (tasks over water)
- Disposable suits (dusty materials or materials that can splash)
- Protective materials include:
  - Wool
  - Duck (cuts and bruises on jobs)
  - Heat-resistant clothing (dry heat and flame)
  - Rubber, rubberized fabrics, neoprene, and plastics (acids and chemicals)
- Clothing that is exposed to hazardous chemicals, dusts, or any potential contaminants should be cared for and cleaned separately from other clothing.

### **Topic: Respiratory Protection**

You learned about protective clothing in the previous topic. In this topic you learned about respiratory protection in detail. Any operation that generates harmful airborne levels of dusts, fumes, sprays, mists, fogs, smokes, vapors, or gases or that may involve oxygen-deficient atmospheres requires the use of effective safety controls.

This must be accomplished, as much as feasible, by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials).

When effective engineering controls are not feasible, or while they are being instituted, appropriate respiratory protection must be used.

Having completed this topic, you should be able to:

- Summarize typical hazards requiring respiratory protection equipment
- Describe the types of respirators
- Explain three basic steps in selecting respiratory equipment
- Use and care for respirators
- Recall your responsibilities when you wear a respirator

#### Topic summary:

Please take a moment to review these points before you continue with the next topic.

- Types of hazards requiring respiratory protection include:
  - Gaseous contaminants
  - Particulate contaminants
  - Atmospheres immediately dangerous to life or health (IDLH)
  - Oxygen-deficient atmospheres
- Two types of respirators are:
  - Air-purifying respirators
  - Atmosphere-supplying respirators
- Respirators must be properly cleaned, inspected, stored, and in good repair if they are expected to work properly.

- Each of you who is required to wear a respirator has certain responsibilities:
  - Always use respiratory equipment as instructed.
  - Guard against damaging your respirator.
  - Go immediately to an area of "clean air" if your respirator malfunctions.
  - Report any malfunctioning of respiratory protective equipment to your supervisor.