# Personal Protective Equipment (PPE): Foot and Leg Protection

Wearing appropriate footwear and leg protection reduces injuries in the workplace by protecting workers' feet, ankles, legs and knees. It also reduces lost work hours, improves productivity and protects clothing.

## Hazards

Examples of workplace hazards that require you to wear foot and leg protection:

- When heavy objects roll or fall onto your feet, you may break or crush bones
- If you work around sharp objects, you are at risk of cuts and puncture wounds
- When exposed to liquids such as acids, caustics and molten metal, you can get chemical and heat burns
- Working in extreme heat or cold environments may cause blisters or frostbite, respectively
- Working on or around hot, wet or slippery surfaces may cause you to fall
- Working when electrical hazards are present puts you at risk of electrical shock, burns or death
- Improperly fitted footwear can cause blisters and abrasions

# **Types of Foot and Leg Protection**

**Leggings** protect the lower legs and feet from heat hazards like molten metal or welding sparks as well as from impact or abrasions. Safety snaps allow leggings to be removed quickly.

**Metatarsal guards** protect the top of the foot from compression injuries. They may be strapped to the outside of shoes to protect the instep area from impact and compression hazards.

**Toe guards** fit over the toes of regular shoes and protect only the toes from impact and compression hazards.

**Combination foot and shin guards** provide total coverage for the lower legs and feet. They may be used in combination with toe guards when greater protection is needed.

Chaps protect the upper and lower legs and are usually hazard- or task-specific:

- Chainsaw chaps are made of multiple layers of cut-resistant fabric designed to jam the chainsaw chain and stop the cutting action before it reaches the skin
- Welding chaps are typically made of leather and provide heat and burn protection from sparks and slag

Waders provide waterproof protection for the feet, legs and lower torso.

#### Safety Shoes

**Safety shoes** have impact-resistant toes and heat-resistant soles that protect against hot work surfaces common in roofing, paving and hot work industries. The metal shank of some safety shoes protect against puncture wounds.

**Electrically conductive and electrostatically dissipative (ESD) shoes** protect against the buildup of static electricity in explosive or hazardous locations. Don't use foot powder or wear nylon, wool or silk socks with these shoes. Never wear them if you are exposed to electrical hazards!

**Electrical hazard, safety-toe shoes** are non-conductive and prevent your feet from completing an electrical circuit to the ground.

**Foundry shoes** insulate your feet from the extreme heat of molten metal and also stop hot metal from lodging in shoe eyelets, tongues or clinging to metal parts of the shoe.

Thermal-insulated shoes are constructed to resist high heat and cold situations.

Waterproof shoes are constructed to keep the feet dry and comfortable in wet conditions.

**Chemical-resistant shoes** are constructed of various materials to protect against chemical and biological hazards. Slip-on overshoes or booties can also be used for chemical or biological protection.

**Puncture-resistant shoes** are designed to protect the midsole of the foot from sharp objects that can pierce or penetrate the sole of the shoe.

**Slip-resistant shoes** provide slip-resistant tread for wet, oily or greasy floors. Shoe chain, cleats or spikes are also available to fit over existing boots to prevent falls on ice, snow or other slick surfaces. *Never wear ice or snow cleats when walking on hard surfaces other than snow or ice.* 

#### **Selecting the Proper Protection**

Select the proper foot and leg protection based on the hazards you may face in the workplace. Footwear should be marked if it is approved for electrical work.

Follow local footwear standards and regulations. In the U.S., safety footwear must meet American Society for Testing and Materials (ASTM) minimum compression and impact performance standards. Check the product's labeling or consult the manufacturer's instructions to make sure the footwear will protect you from the hazards you face.

See Appendix A below for more information on selecting foot and leg protection.

## **Use and Considerations**

Whatever type of foot and leg protection you are required to wear in your job, you must know how to put it on and take it off properly. You should receive hands-on training on:

- How to put the foot and leg protection on properly
- How to adjust straps, laces and other parts for a comfortable and effective fit
- The limitations of the foot and leg protection
- Indications of when to replace old or damaged protective gear

## **Proper Fit**

All footwear and leg protection should provide comfort without compromising protection. The inner side of footwear should be straight from the heel to the end of the big toe. The shoe should grip the heel firmly and the forepart should allow freedom of movement for the toes. The shoe must securely fasten across the instep to prevent the foot from slipping when walking. Improperly fitted shoes can cause abrasions and blisters.

#### **Care and Maintenance**

As with all protective equipment, safety footwear and legwear should be inspected before each use.

Shoes and leggings should be checked for wear and tear often. This includes looking for:

- Cracks or holes in the sole or heel
- Separation of materials between the soles and uppers
- Broken buckles or frayed laces
- Metal or other embedded items in the heels or soles that could present electrical or tripping hazards
- Worn down soles and tread that could decrease protection and traction

If you notice any of these conditions, remove the PPE from service immediately and notify your supervisor so you can get a replacement.

Clean, maintain and store foot and leg protection according to the manufacturer's instructions. In general, store it in a clean, dry location away from direct sunlight.

When working in or around dangerous chemicals, decontaminate your footwear so that you don't transfer these chemicals to your car or home and cause exposure to others. Disposable shoe covers may be used in certain environments, such as cleanrooms, to provide a barrier against possible exposure to harmful contaminants and to prevent the transfer of contamination. Properly dispose of them after a single use.

# Appendix A: Guide to Selecting Foot and Leg Protection

This chart provides general guidance for the proper selection of foot and leg protection.

Protection	Source(s)	Workplace Environments
Steel-toed safety shoes, boots, and toe caps	Impact, compression, cuts, abrasions	Construction, demolition, renovation, plumbing, building maintenance, trenching, utility work, grass cutting, materials handling
Metatarsal footwear	Severe impact or compression to the top of the foot	Jackhammering, pavement breaking, heavy pipes, steel or iron work, skid trucks
Heat-resistant boots, leggings, and chaps	Molten metal, super-heated fluids	Foundry work, welding operations
Chemical-resistant footwear and legwear	Splash hazard or direct contact; work with certain chemicals	Acid and chemical handling, degreasing, plating, and spill response
Static dissipative (SD)	Use with static dissipative flooring	Work on electronics, computer components, solvent-based paints, explosives, and plastics
Conductive footwear (CD)	Work near or in explosive or hazardous atmospheres; DO NOT use when exposed to electrical hazards	Explosives manufacturing, grain milling, spray painting, or similar work with highly flammable materials
Electrical hazard (EH) footwear	Work on or near exposed energized electrical wiring or components; DO NOT use in areas that have potential flammable or explosive atmospheres	Building maintenance, utility work; construction; wiring; work on or near communications, computer, or similar equipment; and arc or resistance welding
Leggings	Impact, compression, cuts, abrasions	Logging operations, tree work, chainsaw work
Waders	Wet environments	Wet environments such as lakes, pools, pits, and fishing
Chaps	Impact, compression, cuts, abrasions	Tree service, logging operations, chainsaw work