

# Personal Protective Equipment

## Foot Comfort and Safety at Work

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## Why is foot comfort important?

There are two major categories of work-related foot injuries. The first category includes foot injuries from punctures, crushing, sprains, and lacerations (cuts). The second group of injuries includes those resulting from slips, trips and falls. Slips and falls do not always result in a foot injury but lack of attention to foot safety plays an important role in their occurrence.

These two categories of foot injuries, however, do not exhaust the whole range of foot problems at work. There are also other conditions such as calluses, ingrown toenails or simply tired feet that are common among workers. Although these may not be considered as occupational injuries in the strictest sense, they can have serious consequences for health and safety at the workplace. They cause discomfort, pain and fatigue. Fatigue sets up the worker for further injuries affecting the muscles and joints. Also, a worker who is tired and suffering from pain is less alert and more likely to act unsafely. An incident of any kind may result.

## What are some causes of foot problems?

Some foot problems are so common that they can occur in any workplace and under any working conditions.

Foot Problems	Common Causes
Severely aching feet, blisters, calluses, corns, rheumatism, arthritis, malformations of toes, fallen arches (flat feet), bunions, sprains	Long periods of standing, hard flooring, and poorly fitted footwear: <ul style="list-style-type: none"> <li>- high heels</li> <li>- pointed shoes</li> <li>- lack of arch support</li> <li>- too loose or too tight footwear</li> </ul>
Sweaty feet, fungal infections (athlete's foot)	Hot and humid environment, strenuous work, footwear with synthetic (non- porous) uppers

There are no comprehensive statistics on these kinds of problems with feet.

## How does the working position contribute to the foot problem?

Common foot problems occur both on and off the job. Still, there is no doubt that some work-related factors can lead to foot problems, especially jobs that require long periods of standing. Since the human foot is designed for mobility, maintaining an upright stance is extremely tiring. Standing for hours, day after day, not only tires the worker's feet but can also cause permanent damage. Continuous standing can cause the joints of bones of the feet to become misaligned (e.g., cause flat feet) and can cause inflammation that can lead to rheumatism and arthritis.

## How does the flooring contribute to the foot problems?

The type of flooring used in the workplace has an important influence on comfort, especially on feet. Hard, unyielding floors like concrete are the least comfortable surfaces to work on. Working on a hard floor has the impact of a hammer, pounding the heel at every step. Slippery floors are hazardous for slips and falls that can result in sprained ankles or broken foot bones.

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## How does the footwear contribute to the foot problems?

Footwear that fits poorly or needs repair also contributes heavily to foot discomfort. Pointed toes and high heels are particularly inappropriate for working footwear.

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## What are some specific examples of workplace foot injuries?

Injuries	Common Causes
Crushed or broken feet, amputations of toes or feet	Feet trapped between objects or caught in a crack, falls of heavy objects, moving vehicles (lift trucks, bulldozers, etc.), conveyor belts (feet drawn between belt and roller)
Punctures of the sole of the foot	Loose nails, sharp metal or glass objects
Cuts or severed feet or toes, lacerations	Chain saws, rotary mowers, unguarded machinery
Burns	Molten metal splashes, chemical splashes, contact with fire, flammable or explosive atmospheres
Electric shocks	Static electricity, contact with sources of electricity
Sprained or twisted ankles, fractured or broken bones because of slips, trips or falls	Slippery floors, littered walkways, incorrect footwear, poor lighting.

Additional hazards for foot injury exist in outdoor jobs such as logging, hydro linework or fishing which involve freezing temperatures, or wetness in low temperature, including injuries such as frostbite and trench foot.

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## How can foot injuries be prevented?

There is no workplace where a worker is immune to foot injury. However, the hazards differ according to the workplace and the types of tasks the worker does. The first step in developing a strategy to reduce foot problems is to identify the relevant hazards at the workplace. Foot injuries then can be prevented by assessing the hazards and looking for preventative measures through proper job design and/or workplace design, and identifying proper foot wear.

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## How can the job design improve foot safety?

Aching, flat or tired feet are common among workers who spend most of their working time standing.

The most important goal of job design is to avoid fixed positions especially fixed standing positions. Good job design includes varied tasks requiring changes in body position and using different muscles. Job rotation, job enlargement and teamwork are all ways to make work easier on the feet.

- Job rotation moves workers from one job to another. It distributes standing among a group of workers and shortens the time each individual spends standing. However, it must be a rotation where the worker does something completely different such as walking around or sitting at the next job.
- Job enlargement includes more and different tasks in a worker's duties. If it increases the variety of body positions and motions, the worker has less chance of developing foot problems.
- Teamwork gives the whole team more control and autonomy in planning and allocation of the work. Each team member carries a set of various operations to complete the whole product. Teamwork allows workers to alternate between tasks which, in turn, reduces the risk of overloading the feet.
- Rest breaks help to alleviate foot problems where redesigning jobs is impractical. Frequent short breaks are preferable to fewer long breaks.

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## How can the workplace design improve foot safety?

Redesigning the job alone will not effectively reduce foot problems if it is not combined with the proper design of the workplace.

- For standing jobs, an adjustable work surface is the best choice. If the work surface is not adjustable, two solutions include installing a platform to raise the shorter worker or a pedestal to raise the object for a taller worker.
- Workstation design should allow the worker room to change body position.

- A foot-rail or footrest enables the worker to shift weight from one leg to the other. This ability reduces the stress on the lower legs and feet.
  - Where possible, a worker should be able to work sitting or standing at will. Even when work can only be done while standing, a seat should be provided for resting purposes.
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## How can one improve the foot safety in workplaces where foot injuries occur frequently?

Job and workplace designs also have the potential to increase foot safety in workplaces that are specifically hazardous. Here are some examples:

- Separating mobile equipment from pedestrian traffic and installing safety mirrors and warning signs can decrease the number of incidents that might result in cut or crushed feet or toes.
  - Proper guarding of machines such as chain saws or rotary mowers can avoid cuts or severed feet or toes.
  - Effective housekeeping reduces the number of incidents at workplaces. For example, loose nails, other sharp objects, and littered walkways are hazards for foot injury.
  - Using colour contrast and angular lighting to improve depth vision in complicated areas such as stairs, ramps and passageways reduces the hazard of tripping and falling.
  - Posting safety signs in conspicuous places where safety footwear is required when there is a potential hazard from falling objects, sharp objects, etc.
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## How can the kind of floor improve foot comfort?

Standing or working on a hard, unyielding floor can cause a lot of discomfort. Wood, cork, carpeting, or rubber – anything that provides some flexibility – is gentler on workers' feet. Where resilient floors are not practical, footwear with thick, insulating soles and shock-absorbing insoles can alleviate discomfort. Anti-fatigue matting can also be useful wherever workers have to stand or walk. They provide a cushioning which reduces foot fatigue. However, the use of matting requires caution. When installed improperly, it can lead to tripping and slipping incidents.

Anti-slip flooring or matting can reduce slipping incidents. If installed properly, these mats are useful, but workers may find that their feet burn and feel sore. The non-slip properties of the flooring mat cause their shoes to grab suddenly on the flooring making their feet slide forward inside the shoes. Friction inside the shoes produces heat that creates soreness and, eventually, calluses. A non-slip resilient insole can reduce this discomfort.

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## What else should I know about footwear?

Proper footwear is important, not only for foot comfort but also for one's general well-being. Improper footwear can cause or aggravate existing foot problems. Unfortunately, being fashionable sometimes takes precedence over choosing well-fitting, supportive safety footwear. However, many safety footwear manufacturers produce safety footwear that does look fashionable.

The best way to involve workers in programs to protect their feet is to provide:

- Training and information on the health hazards of wearing improper shoes.
- Principles for selecting proper shoes.
- Simple rules of general foot care.

Orthotics may help reduce foot issues.

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## What should I know when I buy footwear for work?

Good footwear should have the following qualities:

- The inner side of the shoe must be straight from the heel to the end of the big toe.
- The shoe must grip the heel firmly.
- The forepart must allow freedom of movement for the toes.
- The shoe must have a fastening across the instep to prevent the foot from slipping when walking.
- The heel should be not more than 60 mm (about 2.5 inches), and the heel should not be lower than the ball of the foot. (from CSA Z195:14 (R2019) Protective footwear)

People buying footwear for work should take the following advice:

- Do not expect that footwear which is too tight will stretch with wear.
- Have both feet measured when buying shoes. Feet normally differ in size.
- Buy shoes to fit the bigger foot.
- Buy shoes late in the afternoon when feet are likely to be swollen to their maximum size.
- Ask a doctor's advice if properly fitting shoes are not available.
- Consider using shock-absorbing insoles where the job requires walking or standing on hard floors.

When selecting footwear, one should remember that tight socks or stockings can cramp the toes as much as poorly-fitted shoes. Wrinkled socks, or socks that are too large or too small, can cause blisters. White woollen or cotton socks may be recommended since coloured socks cause skin allergies in some people.

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## What should I know about protective footwear?

In designing strategies to protect foot injury, one must remember the fundamental principle of occupational health and safety: that occupational hazards should be eliminated at the source. The role of personal protective equipment is to minimize exposure to specific occupational hazards, not to eliminate them. Protective footwear does not guarantee total protection. The OSH Answers document [Designing an Effective Personal Protective Equipment \(PPE\) Program](#) discusses personal protective equipment in more detail.

All jurisdictions in Canada require that workers wear adequate protection against workplace hazards. For workers exposed to foot hazards, the required protection is protective footwear certified by the CSA Group (CSA Standard "Protective footwear", CAN/CSA-Z195-14 (R2019)).

All working footwear, for both men and women, whether it is safety wear or not, should provide comfort without compromising protective value. In addition, protective footwear should conform with CSA Standard CAN/CSA-Z195-14 (R2019) or appropriate standard for your jurisdiction.

- A steel toe cap should cover the whole length of the toes from tips to beyond the natural bend of the foot. A soft pad covering the edge of the toecap increases comfort. If the toecap cuts into the foot, either the size or style of the footwear is incorrect.
- Soles come in a variety of thicknesses and materials. They need to be chosen according to the hazards and type(s) of flooring in the workplace.
- Uppers of protective footwear come in a variety of materials. Selection should take into account the hazards, and individual characteristics of the worker's foot.
- A steel midsole which protects the foot against penetration by sharp objects should be flexible enough to allow the foot to bend.
- No one type of non-slip footwear can prevent the wearer from slipping on every surface type.

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## What type of footwear is appropriate for cold conditions?

Selection should be made to suit the specific working condition. Working outdoors in cold weather poses a special requirement on selecting the proper footwear. "Normal" protective footwear is not designed for cold weather. "Insulated" footwear may give little temperature protection in the sole if it has no insulation there. Loss of heat through steel toe caps (commonly blamed for increased heat loss) is insignificant.

Foot protection against cold weather can be resolved by:

- Insulating the legs by wearing thermal undergarments.
- Wearing insulating overshoes over work footwear.
- Wearing insulating muffs around the ankles and over the top of the footwear.

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## How should I care for my feet?

Feet are subject to a great variety of skin and toenail disorders. Workers can avoid many of them by following simple rules of foot care:

- Wash feet daily with soap, rinse thoroughly and dry, especially between the toes.
- Trim toenails straight across and not too short. Do not cut into the corners.
- Wear clean socks or stockings and change them daily.

Some feet sweat more than others and are more prone to athlete's foot. Again, following a few simple guidelines may help:

- Select shoes made of leather or canvas – not synthetic materials.
- Keep several pairs of shoes on hand and rotate shoes daily to allow them to air out.
- For some workers, non-coloured woollen or cotton socks may be recommended since dyes may cause or aggravate skin allergies.
- Use foot powder.
- If problems persist, see a doctor or health care specialist.

In cases of persisting ingrown toenails, calluses, corns, fungal infection and more serious conditions such as flat feet and arthritis, see a doctor and follow the doctor's advice.

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## What exercises can I do at the workstation?

Standing still requires considerable muscular effort. Even so, standing is not exercise – only a strain. It does not allow for the alternate contracting and relaxing of muscles of the feet and legs.



To keep feet healthy, it is necessary to compensate for working in a stationary position. One action that can be done frequently on the job is alternately to contract and relax the calf muscles, and flex and straighten ankles and knees. Another bit of advice is to walk whenever practical instead of riding. More information on exercise for feet can be obtained from a foot specialist or from a local fitness centre.

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