Anyone working in a cold environment may be at risk of cold stress. Some workers may be required to work outdoors in cold environments and for extended periods, for example, snow cleanup crews, sanitation workers, police officers and emergency response and recovery personnel, like firefighters, and emergency medical technicians. Cold stress can be encountered in these types of work environment. The following frequently asked questions will help workers understand what cold stress is, how it may affect their health and safety, and how it can be prevented.

**How cold is too cold?**

What constitutes extreme cold and its effects can vary across different areas of the country. In regions that are not used to winter weather, near freezing temperatures are considered "extreme cold." A cold environment forces the body to work harder to maintain its temperature. Whenever temperatures drop below normal and wind speed increases, heat can leave your body more rapidly.

Wind chill is the temperature your body feels when air temperature and wind speed are combined. For example, when the air temperature is 40°F, and the wind speed is 35 mph, the effect on the exposed skin is as if the air temperature was 28°F.

Cold stress occurs by driving down the skin temperature and eventually the internal body temperature (core temperature). This may lead to serious health problems, and may cause tissue damage, and possibly death.

**What are the risk factors that contribute to cold stress?**

Some of the risk factors that contribute to cold stress are:

- Wetness/dampness, dressing improperly, and exhaustion
- Predisposing health conditions such as hypertension, hypothyroidism, and diabetes
- Poor physical conditioning

**How does the body react to cold conditions?**

In a cold environment, most of the body's energy is used to keep the internal core temperature warm. Over time, the body will begin to shift blood flow from the extremities (hands, feet, arms, and legs) and outer skin to the core (chest and abdomen). This shift allows the exposed skin and the extremities to cool rapidly and increases the risk of frostbite and hypothermia. Combine this scenario with exposure to a wet environment, and trench foot may also be a problem.

**What are the most common cold-induced injuries/illnesses?**

- Hypothermia
- Frostbite
- Trench Foot

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The OSHA Consultation Program provides confidential on-site consultations to private employers, free of charge, to assist employers in identifying and eliminating hazards in the workplace. For more information, visit our website at [www.labor.ok.gov](http://www.labor.ok.gov) or call (405)521-6140 or 1-888-269-5353.
How can cold stress be prevented?

**Employers should train workers** on how to prevent and recognize cold stress illnesses and injuries and how to apply first aid treatment. Workers should be trained on the appropriate engineering controls, personal protective equipment and work practices to reduce the risk of cold stress.

**Employers should provide engineering controls.** For example, radiant heaters may be used to warm workers in outdoor security stations. If possible, shield work areas from drafts or wind to reduce wind chill.

**Employers should use safe work practices.** For example, it is easy to become dehydrated in cold weather. Employers therefore, can provide plenty of warm sweetened liquids to workers. Avoid alcoholic drinks. If possible, employers can schedule heavy work during the warmer part of the day. Employers can assign workers to tasks in pairs (buddy system), so that they can monitor each other for signs of cold stress. Workers can be allowed to interrupt their work, if they are extremely uncomfortable. Employers should give workers frequent breaks in warm areas. Acclimatize new workers and those returning after time away from work, by gradually increasing their workload, and allowing more frequent breaks in warm areas, as they build up a tolerance for working in the cold environment. Safety measures, such as these, should be incorporated into the relevant health and safety plan for the workplace.

**Dressing properly** is extremely important to preventing cold stress. The type of fabric worn also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, silk and most synthetics, on the other hand, retain their insulation even when wet.

The following are recommendations for working in cold environments:

- Wear at least three layers of loose fitting clothing. Layering provides better insulation. Do not wear tight fitting clothing.
- An inner layer of wool, silk or synthetic to keep moisture away from the body.
- A middle layer of wool or synthetic to provide insulation even when wet.
- An outer wind and rain protection layer that allows some ventilation to prevent overheating.
- Wear a hat or hood to help keep your whole body warmer. Hats reduce the amount of body heat that escapes from your head.
- Use a knit mask to cover the face and mouth (if needed).
- Use insulated gloves to protect the hands (water resistant if necessary).
- Wear insulated and waterproof boots (or other footwear).

**Safety Tips for Workers**

- Your employer should ensure that you know the symptoms of cold stress.
- Monitor your physical condition and that of your coworkers.
- Dress properly for the cold.
- Stay dry in the cold because moisture or dampness, e.g. from sweating, can increase the rate of heat loss from the body.
- Keep extra clothing (including underwear) handy in case you get wet and need to change.
- Drink warm sweetened fluids (no alcohol).
- Use proper engineering controls, safe work practices, and personal protective equipment (PPE) provided by your employer.

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**Symptoms of Cold Stress**

Symptoms of cold stress can vary depending on the type of cold-induced injury or illness.

**Hypothermia** occurs when body heat is lost faster than it can be replaced and the body temperature drops to less than 95°F.

Symptoms of hypothermia include shivering, loss of coordination, disorientation, and confusion. It can quickly progress to a loss of motor functions, decreased pulse and respiration, and loss of consciousness. A person can die if they do not receive help immediately.

**Frostbite** is an injury to the body that is caused by freezing skin and underlying tissue. The lower the temperature, the quicker frostbite can occur.

Symptoms of frostbite include reddened skin that develops white/gray patches, numbness, hardening of skin and blisters, in some cases severe.

**Trench foot** or immersion foot is caused by prolonged exposure to wet and cold temperatures. I can occur at temperatures as high as 60°F if the feet are constantly wet. Non-freezing injury occurs because wet feet lose heat 25-times faster than dry feet.

Cold induced injuries and illnesses can quickly escalate to emergencies so it's important to take prompt action when symptoms first appear. Move the person to a warm dry area. Remove wet clothing and change into dry clothes.

Call 911 immediately in an emergency, otherwise seek medical assistance as soon as possible.