

Frostbite Factsheet

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Exposure

Frostbite occurs when the tissues of the skin freeze. This can happen during prolonged exposure to cold weather, or even after a few minutes in extremely low temperatures. Cold winds (wind chill) increase the likelihood for frostbite because the movement of air moves body heat away from the skin more rapidly. Frostbite can occur in 15 minutes or less at wind chill values of 18 below zero or lower. Fingers, toes, ear lobes, and the tip of the nose are the most vulnerable parts of the body to frostbite. Therefore, employers and workers who may participate in outdoor activities or work outdoors in cold weather should take precautions against cold-related conditions like frostbite.

Workers can be at an increased risk to frostbite because of factors such as exhaustion, hunger, and dehydration, which further lower the body's defenses against cold-related conditions.

When the body is exposed to very low temperatures, it tries to prevent heat loss by redirecting the blood away from the extremities. If exposure is prolonged, ice will start to form inside and around skin cells. The ice crystals block the movement of blood through the fine mesh of capillaries, which means the tissue is deprived of oxygen and nutrients. The longer the tissue remains frozen, the greater the amount of damage.

Frostbite is divided into three categories:

- *Frostnip*, the first degree of frostbite, is when a person experiences loss of feeling and white or pale appearance in fingers, toes, ear lobes, and tip of the nose.
- *Superficial frostbite*, the second degree of frostbite, is when the outer layer of skin feels hard and frozen and blisters.
- *Deep frostbite*, the third degree of frostbite, is when the underlying tissues of the skin are hard and frozen and the skin appears blotchy and may have blisters.

Prevention

Employers and workers can take steps to reduce the potential dangers of frostbite.



Superficial frostbite

- Train workers about cold-related conditions.
- Recognize the environmental and workplace conditions that lead to potential cold induced illness and injuries.
- Watch for symptoms of frostbitten skin: cold, white and hard skin; pain; itching; loss of feeling in the affected area; colored spots or blotches on skin; swelling and blistering; skin becomes red and blotchy when warmed; and tissue loss, depending on the severity of the frostbite.
- Be extremely cautious in the wind. A strong wind, even in only moderately cool weather, can cause a wind chill far below freezing.
- Encourage workers to wear proper clothing for cold, wet, and windy conditions. Layer clothing to adjust to changing environmental temperatures. Wear underwear that will keep water away from skin (polypropylene).
- Encourage workers to wear a hat, gloves, and a “cold weather mask”. Since considerable body heat is lost through the scalp and the hands, nose, cheeks, ears, etc., these body parts need protection.
- Be sure that workers take frequent short breaks in warm dry shelters to allow the body to warm up.
- Try to schedule work for the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system – work in pairs so that one worker can recognize danger signs affecting another.
- Drink plenty of fluids that are warm and sweet, avoid drinks with caffeine or alcohol.
- Eat warm, high-calorie foods regularly.
- Check your skin frequently for any signs of frostbite.

Signs of Hypothermia

If a worker shows signs of hypothermia:

- call for emergency help immediately;
- move person to a warm, dry area;
- remove any wet clothing and replace with warm, dry clothing and wrap the person's entire body in blankets or covers;
- take pressure off the affected area to prevent further damage; for example don't allow the person to walk on frostbitten feet;
- don't allow the person to smoke cigarettes, since nicotine constricts the blood vessels;
- don't rub the affected area, as this causes more tissue damage;
- keep any blisters intact; and
- once thawed, wrap affected areas in clean bandages.

It is important to understand that most of the damage of frostbite occurs during rewarming of the affected tissues. If frostbite occurs far from help, it may be unwise to thaw out the affected areas, in case they refreeze again. Thawing and refreezing can cause even more damage to the skin. If the feet are frostbitten, but the person has no option other than to keep walking, it is better to walk on frozen feet, since thawed tissue can be greatly harmed by mechanical damage or pressure.

A person who has experienced severe frostbite can have long-term damage like numbness, sensitivity to the cold, and problems with nail growth.

Employers and workers should always check local weather forecasts for information on temperature and wind chill to prevent cold-related conditions like frostbite.

This Fact Sheet was produced with information from the Metropolitan Ambulance Service, (Victoria, Australia), Texas Health Department, Occupational Safety and Health Administration, and the Texas Workers' Compensation Commission.

