

COLD-RELATED INJURIES/ILLNESSES, SYMPTOMS, FIRST AID, WIND CHILL CHART, and WORK/WARM-UP CONSIDERATIONS

COLD-RELATED INJURIES/ILLNESSES

There are four primary types of health effects from exposure to cold temperatures: hypothermia, frostbite, trench foot, and chilblains.

HYPOTHERMIA: Hypothermia is a medical condition that occurs when the body loses heat faster than it can produce it. It is caused by exposure to cold for a long period of time where the body loses its ability to keep itself warm. Because of its effect on the brain, hypothermia may cause unclear thinking, which increases the risk of harm because the victim may not be able to protect him/herself and resolve the problem of exposure. For information regarding cold injuries, see the [Occupational Safety and Health Administration's \(OSHA\) website](#).

Symptoms:

- Shivering (may stop in some cases)
- Apathy and social withdrawal
- Fatigue, lethargy, drowsiness
- Changing levels of responsiveness
- Loss of coordination
- Confusion and disorientation
- Slurred speech

May Progress To:

- An inability to shiver
- Blue skin
- Dilated pupils
- Slowed pulse and breathing
- Loss of consciousness
- Cardiac and/or respiratory arrest

First Aid:

- Check responsiveness, breathing, and call 911.
- Move the victim into a warm room or shelter.
- Remove any wet clothing from the victim.
- Warm the center of the victim's body first—chest, neck, head, groin—using an electric blanket, if available, or use skin-to-skin contact under loose, dry layers of blankets, clothing, towels, or sheets.
- Provide warm beverages, which may help increase the body temperature. Do not give alcoholic beverages or try to give beverages to an unconscious person.
- After the victim's body temperature has increased, keep him/her dry and wrapped in a warm blanket, including the head and the neck.
- If the victim has no pulse, begin cardiopulmonary resuscitation (CPR).

FROSTBITE: Frostbite is a condition that occurs when skin or other tissues freeze, most commonly involving the nose, ears, cheeks, chin, fingers, or toes. Frozen (or frostbitten) skin or

other tissue loses feeling and normal color. The tissue damage is generally permanent, and the affected area/digit/limb may need to be amputated. Individuals with poor blood circulation are at a higher risk of frostbite and other forms of cold damage since their self-warming capability is limited. Frostbite is a progressive injury that may proceed from frost nip to severe frostbite. For more information on cold-related injuries and illnesses, see the [Centers for Disease Control's \(CDC\) website](#).

Symptoms:

- Reduced blood flow to the hands and feet (fingers or toes can freeze)
- Numbness
- Tingling or stinging
- Aching
- Bluish or pale, waxy skin

First Aid:

- Get into a warm room as soon as possible.
- Remove wet or constricting items.
- Unless absolutely necessary, do not allow walking on frostbitten feet or toes since this increases the damage.
- Immerse the affected area in warm (not hot) water (the temperature should be comfortable to the touch for unaffected parts of the body).
- Warm the affected area using body heat, for example, the heat of an armpit can be used to warm frostbitten fingers.
- Do not rub or massage the frostbitten area as doing so may cause more damage.
- Do not use a heating pad, heat lamp, or the heat of a stove, fireplace, or radiator for warming frostbitten skin. Affected areas are numb and can be burned easily.
- Seek medical attention. If hypothermia is suspected, call 911 or emergency services immediately.

TRENCH FOOT: Trench foot results from the prolonged exposure of feet to wet and cold conditions, which may cause injury to the skin. It can occur at temperatures as high as 60°F if the feet stay wet because wet feet lose heat about 25 times faster than dry feet. The body constricts blood vessels to the feet in an attempt to retain heat, and tissue dies because of the prolonged lack of oxygen and nutrients, and because of the buildup of toxic metabolic products due to poor circulation. For more information about trench foot, see [the CDC's website](#).

Symptoms:

- Reddening of the skin
- Numbness
- Leg cramps
- Swelling
- Tingling pain
- Blisters or ulcers
- Bleeding under the skin
- Gangrene (the foot may turn purple, blue, or gray)

First Aid:

- Remove shoes or boots and wet socks.
- Dry the feet.

- Avoid walking as this may cause further damage to the skin and tissues.
- The best first aid is prevention.

CHILBLAINS: Chilblains is a condition caused by the repeated exposure of skin to cool temperatures without the opportunity to warm up long or often enough to allow the skin to recover. The repeated or prolonged exposure to cooler-than-normal temperatures causes damage to the capillary beds (the groups of small blood vessels) in the skin. In chilblains, this damage is permanent, and the redness and itching will return with additional exposure to the cold. Temperatures that may cause chilblains range from just above freezing to as high as 60°F.

Symptoms:

- Redness
- Itching
- Possible blistering
- Inflammation
- Possible ulceration in severe cases

First Aid:

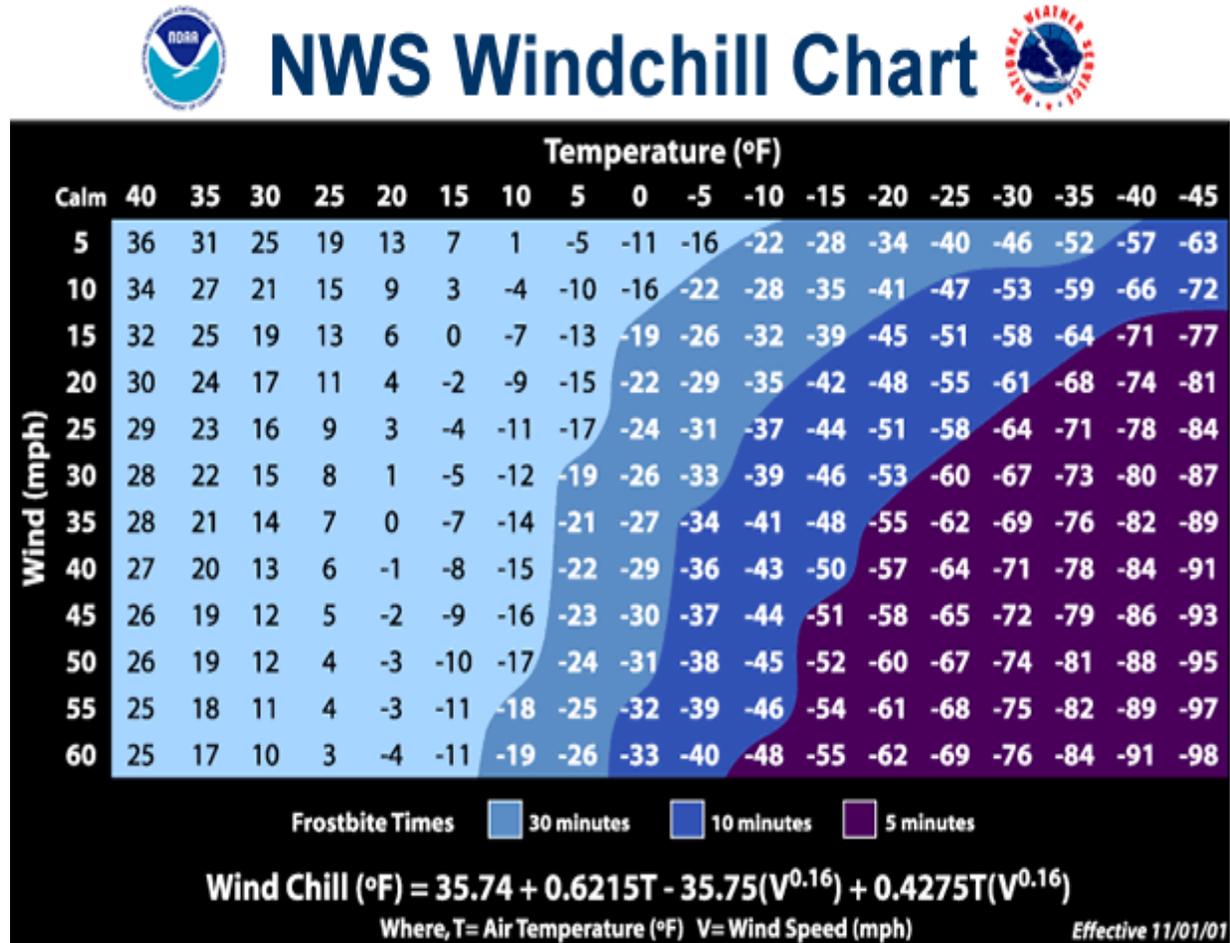
- Avoid scratching the itchy areas.
- Slowly warm the skin.
- Use corticosteroid creams to relieve itching and swelling.
- Keep blisters and ulcers clean and covered.

PROTECT YOURSELF WHEN WORKING IN COLD WEATHER

- Wear appropriate clothing.
- Wear several layers of loose clothing. Layering provides better insulation.
- Tight clothing reduces blood circulation. Warm blood needs to be circulated to the extremities.
- When choosing clothing, be aware that some clothing may restrict movement, resulting in a hazardous situation.
- Make sure to protect the ears, face, hands, and feet in extremely cold weather.
- Boots should be waterproof and insulated.
- Wear a hat; it will keep your whole body warmer. (Hats reduce the amount of body heat that escapes from your head.)
- Move into warm locations during work breaks. Limit the amount of time outside on extremely cold days.
- Carry cold weather gear, such as extra socks, gloves, hats, jacket, blankets, a change of clothes, and a thermos of hot liquid.
- Include a thermometer and chemical hot packs in your first aid kit.
- Avoid touching cold metal surfaces with bare skin.
- Monitor your physical condition and that of your coworkers.

WIND CHILL

Wind chill involves the combined effects of air temperature and air movement. The wind chill cooling rate is the heat loss resulting from the effects of air temperature and wind velocity on exposed skin. The higher the wind speed and the lower the temperature in the work environment, the greater the insulation value of clothing required.



GUIDANCE FOR DETERMINING WORK IN COLD ENVIRONMENTS

When assessing hazards for field work in cold environments, take the following into consideration:

- What will the wind chill factor be?
- Are the people performing the work acclimatized to the conditions?
- Is work conducive to the use of work/warming ratios (see below)?

WORK/WARM-UP SCHEDULE FOR A 4-HOUR SHIFT

The following schedule applies to any 4-hour period with moderate to heavy work activity, with warm-up periods of 10 minutes in a warm location and with an extended break (e.g., lunch) in a warm location at the end of the 4-hour work period.

Air Temperature (°F) – Sunny Sky	No noticeable wind		5 mph wind		10 mph wind		15 mph wind		20 mph wind	
	Max. Work Period (mins)	# of Breaks	Max. Work Period (mins)	#. Of Breaks	Max. Work Period (mins)	# of Breaks	Max. Work Period (mins)	# of Breaks	Max. Work Period (mins)	# of Breaks
-15 TO -19	Normal	1	Normal	1	75	2	55	3	40	4
-20 TO -24	Normal	1	75	2	55	3	40	4	30	5
-25 TO -29	75	2	55	3	40	4	30	5	Emergency Work Only	
-30 TO -34	55	3	40	4	30	5	Emergency Work Only			
-35 TO -39	40	4	30	5	Emergency Work Only					
-40 TO -44	30	5	Emergency Work Only							
-45 and Below	Emergency Work Only									

When weather information is not available, the following signs may help to estimate wind speeds in the field:

- 5 mph (8 km/hr) — light flag moves
- 10 mph (16 km/hr) — light flag is fully extended by the wind
- 15 mph (24 km/hr) — raises a newspaper sheet off the ground
- 20 mph (32 km/hr) — wind capable of blowing snow