

Cold-Weather Casualties & Injuries

Commanders and Unit NCOs are responsible for the health and safety of their troops by:

- Training soldiers on the proper use of cold weather clothing.
- Remembering the acronym **C-O-L-D** when wearing clothing in cold weather (C: Keep it Clean; O: avoid Overheating; L: wear clothing Loose and in Layers; D: keep clothing Dry).
- Maintaining adequate hydration and ensuring nutritional requirements are met.

Soldiers are responsible for preventing individual cold-related injuries such as:

- Chilblain
- Immersion foot (trench foot)
- Frostbite
- Hypothermia
- Dehydration
- Snow Blindness
- Carbon Monoxide Poisoning

See inside for further information

Time in Minutes until the Occurrence of Cheek Frostbite in the Most Susceptible Five Percent of Personnel

Wind Speed (mph)	Air Temperature (°F)											
	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	>120	>120	>120	>120	31	22	17	14	12	11	9	8
10	>120	>120	>120	28	19	15	12	10	9	7	7	6
15	>120	>120	33	20	15	12	9	8	7	6	5	4
20	>120	>120	23	16	12	9	8	8	6	5	4	4
25	>120	42	19	13	10	8	7	6	5	4	4	3
30	>120	28	16	12	9	7	6	5	4	4	3	3
35	>120	23	14	10	8	6	5	4	4	3	3	2
40	>120	20	13	9	7	6	5	4	3	3	2	2
45	>120	18	12	8	7	5	4	4	3	3	2	2
50	>120	16	11	8	6	5	4	3	3	2	2	2

Note: Wet skin could significantly decrease the time for frostbite to occur.
FROSTBITE RISK

LOW – freezing is possible, but unlikely (WHITE)

HIGH – freezing could occur in 10–30 minutes (LIGHT GREY)

SEVERE – freezing could occur in 5–10 minutes (DARK GREY)

EXTREME – freezing could occur in <5 minutes (MEDIUM GREY)

General Guidance for all Cold-Weather Training

- **Skin:** Cover exposed skin because it is more likely to develop frostbite. Avoid wet skin (common around the nose and mouth). Inspect hands, feet, face and ears frequently for signs of frostbite.
- **Clothing:** Change into dry clothing at least daily and whenever clothing becomes wet. Wash and dry feet and put on dry socks at least twice daily.
- **Nutrition:** Consume 4500 calories/day/soldier. This is equivalent to three meal packets in Meal-Cold Weather (MCW) or three to four MREs.
- **Hydration:** Consume 3 to 6 quarts of liquid (canteens)/day/soldier. Warm, sweet drinks are useful for re-warming.
- **Camouflage:** Consider not using skin camouflage below 32° F because skin camouflage obscures detection of cold injuries.

These guidelines are generalized for worldwide use. Commanders of units with extensive extreme cold-weather training and specialized equipment may opt to use less conservative guidelines. Cold injury prevention is a command responsibility.

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List of recommended preventive measures to decrease frostbite risk

Low Freezing is possible below 32 °F, but unlikely	High Freezing could occur in 10-30 minutes	Severe Freezing could occur in 5-10 minutes	Extreme Freezing could occur in less than 5 minutes
<ul style="list-style-type: none"> » Increase surveillance with self and buddy checks. » Wear appropriate layers and wind protection for the work intensity. » Cover exposed flesh if possible. » Wear vapor barrier (VB) boots below 0 °F. » Avoid sweating. 	<ul style="list-style-type: none"> » Mandatory buddy checks every 20–30 minutes. » Wear ECWCS* or equivalent and wind protection including head, hands, feet, face. » Cover exposed flesh. » Wear VB boots below 0 °F. » Provide warming facilities. » Avoid sweating. 	<ul style="list-style-type: none"> » Mandatory buddy checks every 10 minutes. » Wear ECWCS* or equivalent and wind protection including head, hands, feet, face. » Wear VB boots. » Provide warming facilities. » Work groups of no less than two personnel. » No exposed skin. » Stay active. » Avoid sweating. 	<ul style="list-style-type: none"> » Be ready to modify activities due to extreme risk. » Wear ECWCS* or equivalent and wind protection including head, hands, feet, face. » Wear VB boots. » Provide warming facilities. » Keep task duration as short as possible. » Work groups of no less than two personnel. » No exposed skin. » Stay active. » Avoid sweating.

* Extended cold weather clothing system (ECWCS). Note: Wet skin could significantly speed the time for frostbite to occur. Trench Foot can occur at any temperature. Always keep feet warm and dry.

Cold-Weather Casualties and Injuries Chart

Chilblain

Cause

- Continuous or repeated exposure of skin to cold/wet weather conditions at temperatures below 50 °F for more than 1-5 hours

Symptoms

- Swollen, red skin (or darkening of the skin in dark-skinned soldiers) with rash-like appearance
- Tender, painful skin. Upon rewarming, skin is red, hot, and itchy.

First-Aid

- Warm affected area with direct body heat.
- Do not massage or rub affected areas.
- Do not wet the area or rub it with snow or ice. Do not expose affected area to open fire, stove, or any other intense heat source.

Prevention

- Use contact gloves to handle all equipment; never use bare hands.
- Use approved gloves to handle all fuel and POL* products.
- In extreme cold environments, do not remove clothing immediately after heavy exertion (PT); wait until you are in a warmer location.
- Avoid cotton clothing, which holds perspiration, in cold-weather environments.

Hypothermia

Cause

- Prolonged cold exposure and core body-heat loss. May even occur at temperatures above freezing, especially when a person's skin or clothing is wet.

Symptoms

- Shivering may be present
- Drowsiness, mental slowness, lack of coordination; may progress to unconsciousness, irregular or slow heartbeat, and death.

First-Aid

- Get the soldier to a medical facility as soon as possible. Hypothermia is a medical emergency and may be fatal.
- Never assume someone is dead until determined by a medical authority, even if a victim is cold and not breathing.
- Remove wet clothing, wrap victim in blankets or a sleeping bag, and move indoors.
- Place another person in sleeping bag as an additional heat source.
- Minimize handling of the unconscious victim with a very weak and slow heartbeat so as to not induce a heart attack.

Prevention

- Avoid cotton clothing in cold-weather environments.
- Anticipate the need for warming areas for soldiers exposed to cold conditions.

Frostbite

Cause

- Exposure to below freezing temperatures (< 32°F) causing freezing of skin, fingers, toes, ears and facial parts
- Exposure of skin to metal, super cold fuel and POL*, wind chill, and tight clothing, particularly boots

Symptoms

- Numbness in affected area

- Tingling, blistered, swollen, or tender areas
- Pale, yellowish, waxy-looking skin (grayish in dark-skinned soldiers)
- Frozen tissue that feels wooden to the touch

First-Aid

- Start first-aid immediately. Warm affected area with direct body heat.
- Do not thaw frozen areas if treatment will be delayed.
- Do not massage or rub affected areas.
- Do not wet the area or rub it with snow or ice.
- Do not expose affected area to open fire, stove, or any other intense heat source.
- Evacuate as soon as possible, because frostbite can lead to amputation.

Prevention

- Use contact gloves to handle all equipment; never use bare hands.
- Use approved gloves to handle all fuel and POL* products.
- Avoid cotton clothing, which holds perspiration in cold-weather environments.
- Keep face and ears covered and dry.
- Keep socks clean and dry.
- Avoid tight socks and boots.

Immersion foot (trench foot)

Cause

- Prolonged (>12 hrs) exposure of tissue especially the feet to wet cold and conditions at 32 °F to 60 °F. Inactivity and damp socks and boots (or tightly laced boots that impair circulation) speed onset and severity.

Symptoms

- Cold, numb feet that may progress to hot w/shooting pains.
- Swelling, redness, and bleeding with may become pale and blue.

First-Aid

- Get medical help immediately.
- Remove wet and constrictive clothing.
- Dry and clean tissues gently. Rewarm feet by exposing them to warm air.
- Do not allow victim to walk on injury.
- Do not massage, rub, moisten, or expose affected area to extreme heat or lotions. Do not pop blisters.
- Evacuate victim to a medical facility.

Prevention

- Keep feet clean and dry; change wet or damp socks as soon as possible.
- Wipe the inside of Vapor Barrier boots dry at least once per day, or more often as feet sweat.
- Dry leather boots by stuffing with paper towels.

Additional Medical Considerations in the Cold Weather Environment

Dehydration

Cause

- Depletion of body fluids

Symptoms

- Dizziness

- Weakness or fatigue
- Blurred vision
- Thirst
- Dark, concentrated urine

First-Aid

- Replace lost water. Water should be sipped, not gulped. Warm fluids helpful for re-warming.
- Get medical treatment if necessary.

Prevention

- Consume 3-6 quarts of water per day at a minimum.
- Monitor urine color intensity.

Snow Blindness

Cause

- Burning of the cornea of the eye by exposure to intense UV rays of the sun in a snow-covered environment

Symptoms

- Eye-pain, redness, watery or gritty feeling in the eyes

First-Aid

- Rest in total darkness; bandage eyes with gauze.
- Evacuate if no improvement within 24 hours.

Prevention

- Use sunglasses with side protection in a snow-covered environment. Use improvised slit glasses if sunglasses are not available. Cut or tear opaque strips of tape and apply to glasses or make cardboard glasses and cut out horizontal slits from eye area.

Carbon Monoxide Poisoning

Cause

- Displacement of oxygen by carbon monoxide in the blood stream from burning fuels without proper exhausting and ventilation

Symptoms

- Headache, confusion, dizziness, excessive yawning
- Cherry red lips and mouth (in light-skinned individuals); grayish tint to lips and mouth (in dark-skinned individuals)
- Unconsciousness

First-Aid

- Move to fresh air and administer oxygen if available.
- CPR if needed.
- Evacuate.

Prevention

- Use only Army-approved heaters in sleeping areas and ensure that personnel are properly trained to operate the heaters.
- Never sleep in idling vehicles.
- Always post a fire guard when operating a heater in sleeping areas.

*POL-petroleum, oil, lubricants.

For additional information refer to U.S. Army Technical Bulletin 508.