

POLICY STATEMENT

Cold Stress is a well-known, recognized workplace hazard. All work operations involving exposure to low temperatures have the potential for inducing cold stress. This policy has been developed to address these issues. All employees will receive training relating to the causes and effects of, the personal and environmental factors that may lead to, and prevention measures to fight cold stress.

RESPONSIBILITIES

Preventing cold stress is a cooperative effort between this company and its employees.

Employer Responsibilities

It is the responsibility of this company to:

- Provide employees with information on signs and prevention of cold stress; and
- Provide reliable means of preventing cold stress and other related health hazards.

Employee Responsibilities

Employees working in cold environments where illness or injury is a risk are expected to:

- Wear appropriate clothing.
- Make sure to protect ears, face, hands, and feet.
- 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.

TRAINING

We will ensure every employee is provided training on all equipment, procedures and processes to protect from cold stress. This training will be provided at no cost to the employee during working hours.

Training will use only training material that is appropriate in content and vocabulary to educational level, literacy, and language of employees.

Training Components

The safety coordinator will ensure that every employee will be trained in the following minimum elements:

- proper clothing and equipment
- safe work practices
- guidelines for eating and drinking
- risk factors that increase the health effects of cold exposure
- how to recognize signs and symptoms of frostbite
- how to recognize signs and symptoms of hypothermia; and
- Appropriate first aid treatment, including rewarming procedures.

Training Records

Training records will include the following information:

- The dates of the training sessions;
- The contents or a summary of the training sessions;
- The names and qualifications of persons conducting the training; and
- The names and job titles of all persons attending the training sessions.

Employee training records will be maintained for 3 years from the date on which the training occurred.

POLICY

Introduction & Overview

Workers exposed to extreme cold or who work in cold environments are at risk of cold stress. Extremely cold or wet weather is a dangerous situation that can cause occupational illness and injuries such as hypothermia, frostbite and trench foot. When the body is unable to warm itself, serious cold-related illnesses and injuries may occur, and permanent tissue damage and death may result.

An individual gains body heat from food and muscular activity and loses it through convection, conduction, radiation and sweating to maintain a constant body temperature. When a person's body temperature drops even a few degrees below its normal temperature of 98.6°F, the blood vessels constrict, decreasing peripheral blood flow to reduce heat loss from the surface of the skin. Shivering generates heat by increasing the body's metabolic rate.

Risk Factors

The four environmental conditions that cause cold-related stress are low temperatures, high/cool winds, dampness and cold water. One of the gravest dangers of winter weather is wind chill. The wind chill is based on the rate of heat loss from exposed skin by combined effects of wind and cold. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. Figure 1 shows a wind chill chart from the National Weather Service.

Wind Chill Chart

Temperature (°F)

Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times:  30 minutes  10 minutes  5 minutes

To work safely, these challenges have to be counterbalanced by proper insulation, such as layered protective clothing, physical activity and by controlling exposure; e.g., work/rest schedule.

Air Temperature: Air temperature is measured by an ordinary thermometer in degrees Fahrenheit (°F) or degrees Celsius (°C).

Wind Speed: Various types of commercially-available anemometers are used to measure wind speed or air movement.

Wind speed is usually measured in km/h or mph. The following is a suggested guide for estimating wind speeds if accurate information is not available:

- 5 mph (8 km/h): light flag moves.
- 10 mph (16 km/h): light flag fully extended.
- 15 mph (24 km/h): raises newspaper sheet.
- 20 mph (32 km/h): causes blowing and drifting snow.

Humidity: Water conducts heat away from the body 25 times faster than dry air.

Physical Activity: The production of body heat by physical activity is difficult to measure. However, tables are available in literature, which shows metabolic rates for a variety of activities. Metabolic heat production is measured in kilo calories (kcal) per hour. One kilocalorie is the amount of heat needed to raise the temperature of one kilogram of water by 24°F.

Diet: Workers have increased energy requirements when working in the cold. Consider adding additional wholesome foods to the diet, such as pasta, potatoes, rice, dairy products, nuts, meat, herring and salmon. Light snacks and warm fluids should be taken during rest breaks. Alcohol must not be consumed when working in the cold. Alcohol produces a deceptive feeling of warmth but may contribute to dehydration and impair judgment.

Work/rest Schedule: Regular rest breaks in a heated area are recommended for anyone working in the cold. The frequency of breaks depends on the air temperature and wind speed, as well as the degree of physical activity.

Protective Clothing: To be protected from the cold, workers should dress in layers.

- The inner layers should trap moisture and wick it away from the body; the middle layers provide insulation; the outer layers protect against the wind and weather.
- As work activity and environmental conditions change, workers should be able to easily add or remove layers.

Wind Chill

At any temperature, you feel colder as the wind speed increases. The combined effect of cold air and wind speed is expressed as equivalent chill temperature (ECT) or simply wind chill temperature in degrees Fahrenheit or Celsius (see Figure 1).

- It is essentially the air temperature that would feel the same on exposed human flesh as the given combination of air temperature and wind speed.
- It can be used as a general guideline for deciding clothing requirements and the possible health effects of cold.
- In some parts of the United States, the term wind chill factor is used. This is a measurement of a heat loss rate caused by exposure to wind and it is expressed

as the rate of energy loss per unit area of exposed skin per second (e.g., joules/[second-metre²] or watts/metre², W/m²).

- Cold Stress Prevention Controlling Cold Stress Environmental Measures.
- Temperature and wind conditions should be known; e.g., weather report on the radio, current weather office information.
- Steps should be taken to protect workers from wind (or indoors from drafts or forced air from air handling units). The combination of low temperatures and even moderate winds can quickly create dangerous working conditions.
- Ensure that heated rest areas, such as a truck cab, tent or hut, are available.

Equipment Design

For work below the freezing point, metal handles and bars should be covered by thermal insulating material. Also, machines and tools should be designed so that they can be operated without a person having to remove mittens or gloves.

Here are some examples of engineering controls to reduce cold exposure:

- Isolate the worker from the environment, where possible.
- Use local heating for the body and especially bare hands (when fine work is required).
- This may include the use of warm air jets, radiant heaters, or contact warming plates.
- Provide structures to block air or reduce air velocities at the work location.
- Provide heated metal tools and handles or cover them with thermal insulating materials.
- Use machine controls and tools designed so that workers do not have to remove mittens or gloves to use them.

Work Practices

A schedule of regular rest breaks should be established to allow workers to warm up. These breaks should be not less than 10 minutes in length and should be taken in a heated area.

- Heated warming shelters; e.g., tents, cabins, rest rooms, should be provided.
- When entering the heated shelter, outer and middle clothing layers (as necessary) should be removed to prevent overheating and to allow dampness to evaporate. A change of dry clothing may be necessary since returning to cold work while damp or sweaty may result in rapid chilling.
- Warm fluids should be consumed at the work site to provide energy and warmth and to replace fluids lost during work.

- Recognize the symptoms of cold stress. The onset of severe shivering, the feeling of excessive fatigue, drowsiness, irritability or euphoria indicate the need to immediately return to the shelter.

The following additional precautions apply at colder temperatures:

- Workers should be under constant protective observation by a buddy or supervisor.
- Work rate should not be high enough to cause sweating. If heavy work must be performed, rest periods in heated shelters and the opportunity to change into dry clothing should be provided.
- New employees should not be required to work full-time in the cold during the first days of employment until they become accustomed to the working conditions and required protective clothing.
- Weight and bulkiness of clothing should be included in estimating required work performance.
- Work should be arranged to minimize periods of standing or sitting still.
- Workers should be appropriately trained.
- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries.
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker.
- Train the workforce about cold-induced illnesses and injuries.
- Select proper clothing for cold, wet and windy conditions. Layer clothing to adjust to changing environmental temperatures. (Tight clothing, however, can reduce blood circulation to the extremities.) Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene). Be aware that some clothing may restrict movement resulting in a hazardous situation.
- Protect the ears, face, hands and feet in extremely cold or wet weather. Boots should be waterproof and insulated.
- Wear a hat to reduce the loss of body heat from your head.
- Carry extra socks, gloves, hats, jacket, blankets, a change of clothes and a thermos of hot liquid.
- Include chemical hot packs in your first aid kit.
- Avoid touching cold metal surfaces with bare skin.
- Take frequent short breaks in warm dry shelters to allow the body to warm up.
- Perform work during 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).
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea or hot chocolate) or alcohol.
- Eat warm, high-calorie foods like hot pasta dishes.

Dressing for the cold

Clothes must be layered to manage moisture and keep dry. Insulating layers trap air for warmth, and outer layers protect workers from wind and weather.

To remain comfortable as weather and work conditions change, clothing layers should be added or removed, or ventilation openings in clothing opened or closed.

Every effort must be made to avoid sweating and becoming damp. Clothing selections are normally made on the basis of staying warm while inactive. Consider the work to be performed and weather conditions, and then have workers dress so layers can be shed and still remain comfortably warm. If clothing layers do become damp and remain that way, workers should be prepared to replace them before becoming chilled and hypothermic. If a worker is sweating, then his or her clothing is probably too warm for the conditions and tasks being performed.

Hand wear

- Mittens keep hands warmer than gloves since fingers are together. With gloves, fingers are separated and lose heat from one another.
- Have workers wear thin liners under gloves or mittens. Liners need not be removed when removing the gloves.
- Removable glove and mitten liners can be replaced and dried when they become damp.
- New mitten styles, including three-finger lobster claws that keep fingers warm yet offer good dexterity are available.
- Windproof overmitts offer additional hand protection, without adding significant bulk.

Headwear

- Up to 50% of body heat is lost through the head. A hat or other head protection must be worn in the cold.
- Avoid cotton; use synthetic fabrics or wool instead.
- Workers must use an appropriate hard hat liner to reduce heat.
- Select a hat appropriate for the weather conditions and activity level. Consider thickness, extent of head coverage (e.g., open-faced, full balaclava, ear

coverage), need for wind protection, effect on vision and hearing, and ability to fit into or over protective headwear, if required.

- A facemask and eye protection may sometimes be necessary.

Footwear

- Warm, insulated safety footwear is essential. Boots should have thick soles for insulation while standing in snow or on cold concrete. Footwear selection should be based on the work being performed, the surfaces on which the worker will work and the weather conditions to which the worker will normally be exposed. Tight-fitting boots reduce circulation and can make feet feel cold.
- Footwear should be sized so that it will accommodate an extra layer(s) of socks.
- A synthetic sock liner, worn beneath a synthetic blend or wool outer sock, wicks moisture away from the skin, keeping feet drier and warmer.

COLD-ENVIRONMENT CONDITIONS & FIRST AID MEASURES

Hypothermia

Symptoms of hypothermia can vary depending on how long you have been exposed to the cold temperatures. They include:

Early

- Shivering
- Fatigue
- Loss of coordination
- Confusion and disorientation

Late

- No shivering
- Blue skin
- Dilated pupils
- Slowed pulse and breathing
- Loss of consciousness

Treating hypothermia

- Alert the supervisor and request medical assistance.
- Move the victim into a warm room or shelter.
- Remove their wet clothing.
- Warm the center of their body first—chest, neck, head, and groin—using an electric blanket, if available; or use skin-to-skin contact under loose, dry layers of blankets, clothing, towels, or sheets.
- Warm beverages may help increase the body temperature, but do not give alcoholic beverages. Do not try to give beverages to an unconscious person.
- After their body temperature has increased, keep the victim dry and wrapped in a warm blanket, including the head and neck.
- If victim has no pulse, begin cardiopulmonary resuscitation (CPR).

Cold Water Immersion

Cold water immersion creates a specific condition known as immersion hypothermia. It develops much more quickly than standard hypothermia because water conducts heat away from the body 25 times faster than air. Typically people in temperate climates don't consider themselves at risk from hypothermia in the water, but hypothermia can occur in any water temperature below 70°F. Survival times can be lengthened by wearing proper clothing (wool and synthetics and not cotton), using a personal flotation device (PFD, life vest, immersion suit, dry suit), and having a means of both signaling rescuers (strobe lights, personal locator beacon, whistles, flares, waterproof radio) and having a means of being retrieved from the water. Below you will find links with information about cold water survival and cold water rescue.

Frostbite

Frostbite is an injury to the body that is caused by freezing. Frostbite causes a loss of feeling and color in the affected areas. It most often affects the nose, ears, cheeks, chin, fingers, or toes. Frostbite can permanently damage body tissues, and severe cases can lead to amputation. In extremely cold temperatures, the risk of frostbite is increased in workers with reduced blood circulation and among workers who are not dressed properly.

Symptoms of frostbite include:

- Reduced blood flow to hands and feet.
- Numbness.
- Tingling or stinging.
- Aching.
- Bluish or pale, waxy skin.

Workers suffering from frostbite should:

- Get into a warm room as soon as possible.
- Unless absolutely necessary, do not walk on frostbitten feet or toes-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; 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. Affected areas are numb and can be easily burned.

Trench Foot

Trench foot, also known as immersion foot, is an injury of the feet resulting from prolonged exposure to wet and cold conditions. Trench foot can occur at temperatures as high as 60 degrees F if the feet are constantly wet. Injury occurs because wet feet lose heat 25-times faster than dry feet. Therefore, to prevent heat loss, the body constricts blood vessels to shut down circulation in the feet. Skin tissue begins to die because of lack of oxygen and nutrients and due to the buildup of toxic products.

Symptoms of trench foot include:

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

Workers suffering from trench foot should:

- Remove shoes/boots and wet socks.
- Dry their feet.
- Avoid walking on feet, as this may cause tissue damage.

Chilblains

Chilblains are caused by the repeated exposure of skin to temperatures just above freezing to as high as 60 degrees F. The cold exposure causes damage to the capillary beds (groups of small blood vessels) in the skin. This damage is permanent and the redness and itching will return with additional exposure. The redness and itching typically occurs on cheeks, ears, fingers, and toes.

Symptoms of chilblains include:

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

Workers suffering from chilblains should:

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

FORMS AND ATTACHMENTS

On the following pages, please find the Cold Stress Training Record document. This form may be reproduced for the purposes of implementing and maintaining a safety and health program.

