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# Cold Stress Safety Program

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## Introduction

The University of North Carolina at Pembroke's EH&S Office has developed this Program to protect employees who are exposed to excessive cold or who work in cold environments while at work. Various reasons can contribute to cold stress such as low air temperature, cool high wind, dampness, and cold water. Cold stress can result in hypothermia, frostbite, or trench foot.

## Scope

This Program applies to all university employees who are exposed to or may become exposed to excessive cold during the course of performing their job duties.

## Responsibility

### Environmental Health & Safety (EHS):

- Assisting departments in implementing the provisions of this Program;
- Updating the Program as necessary;
- Validating Program implementation;
- Providing training and education resources regarding cold stress; and
- Performing cold exposure assessments for employees.

### Facilities Operations (FO):

- Determining and reporting outdoor wind chill index to effected departments as specified in this Program; and
- Providing emergency heat when necessary.

### Departments and Supervisors:

- Ensuring employees are trained in identifying the signs and symptoms of cold-related illnesses;
- Assessing employees work load and assigning work and rest schedules as needed;
- Monitoring the wind chill index and pursuing, implementing, and enforcing the use of proper protective equipment (PPE) for employees as specified in this Program;
- Notifying EH&S for the respective campus of specialized job task or environments, as defined in this Program, that require a cold exposure assessment;
- Reporting the results of all cold exposure assessment to employees; and

- Following their respective campus procedure for reporting occupational injuries and illnesses.

### **Employees:**

- Working in accordance with the provisions of this Program;
- Understanding the signs and symptoms of cold-related illnesses;
- Notifying the supervisor if conditions exist that may lead to a cold-related illness; and
- Notifying the supervisor if they experience symptoms of a cold-related illnesses.

## **Protecting Employees**

The EH&S Office has developed protective criteria for employees based upon the wind chill and other measures of cold stress exposure. The wind chill factor combines both air temperatures and wind speed into a single unit ([Appendix A](#)). The lower the wind chill the colder the environment will feel and the greater the risk that employees will experience a cold-related illness.

Individual vulnerability to cold-related illness can vary widely between employees. Risk factors include: wetness/dampness; proper dress; exhaustion; predisposing health conditions such as hypertension, hypothyroidism, and diabetes; and poor physical conditioning.

Employees gradually acclimatize when exposed to cold conditions. This may take several weeks. When the wind chill is low, special precautions are needed to protect un-acclimatized employees while they adjust to the cold particularly on the first few days they are exposed to cold conditions. Supervisors should monitor employees closely for signs of cold stress during this period and they should adopt appropriate work-rest schedules for these employees, starting with longer rest periods, that are adjusted over a two week period. Re-acclimatization may also be necessary when employees are away from the cold conditions for a few days.

## **Outdoor environments**

For employees working outdoors without heat, scheduled breaks in warm areas are appropriate ([Appendix B](#)). Employees should drink warm sweet beverages and take breaks in warm areas as needed. Supervisors should consider scheduling the most work for the warmest part of the day, assigning extra employees to high demand tasks that will require longer periods in cold areas. All employees should watch out for the safety of their coworkers and work in pairs.

## Acclimatization

A new employee should not be required to work in the cold for an extended time during the first days of employment until they become adjusted to the working condition and required protective clothing. New employees should be introduced to the work schedule slowly and trained accordingly.

## Personal protective equipment

PPE is an important factor in preventing cold-related illnesses and injuries. Employees should adhere to the following recommendations when dressing for work in a cold environment:

- Wear at least three layers of clothing; an inner layer of wool, silk, or synthetic to wick 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 (up to 40 percent of body heat can be lost when the head is left exposed);
- Wear insulated boots or other footwear and wool socks.
- Do not wear tight clothing (loose clothing provides better ventilation); and
- Keep a change of clothing available in case work clothes become wet.

## Cold related illnesses and emergencies

If employees report or supervisors observe signs and symptoms of a cold-related illness, stop all activity immediately. Hypothermia and frostbite are medical emergencies. Call for Emergency Medical help immediately if an employee shows any sign of a cold-related illness/injury. If an employee is believed to be experiencing cold-related symptoms, [Appendix C](#) provides a list of recommended actions. These recommended actions should only be used as a guide to respond appropriately to known or reported symptoms. In all cases of cold-related symptoms noted in [Appendix C](#), employees should be referred to Emergency Medical help immediately. The EH&S Office should then be contacted prior to the continuation of work by other employees.

## Training and recordkeeping

Cold stress prevention training is available by contacting the EH&S office.

## References

[CDC Cold Stress](#)

[National Weather Service \(NWS\) Weather Prediction Center](#)

[OSHA Protecting Workers from Cold Stress](#)

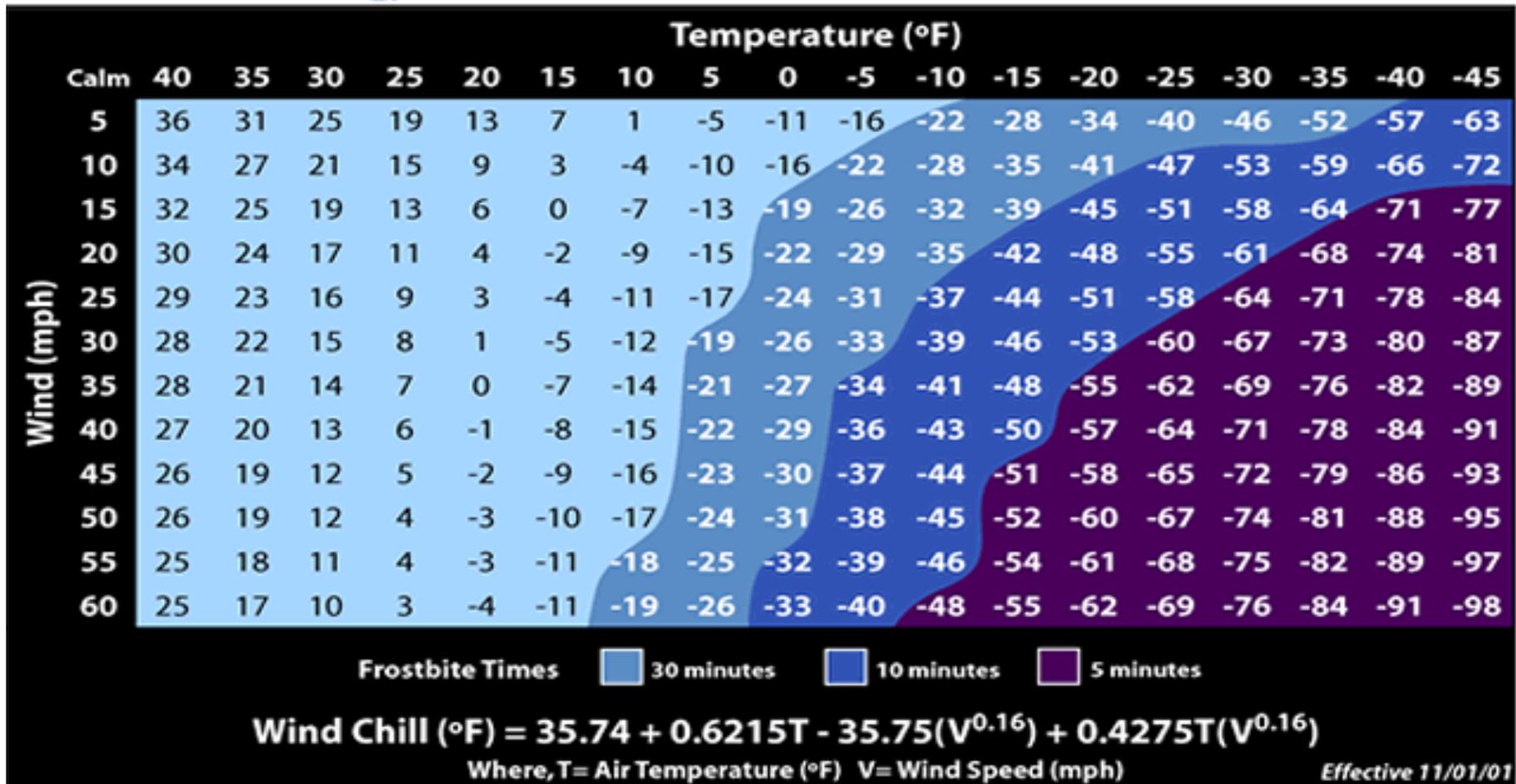
[OSHA Winter Weather](#)

## Appendices

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# Wind Chill Chart





## Work/warm-up schedule for a 4-hour shift

**Table 6.4 Threshold Limit Values Work/Warm-Up Schedule for Four-Hour Shift\***

| Air Temperature<br>Sunny Sky |               | No Noticeable<br>Wind<br>Max       |                  | 5 mph Wind<br>Max                     |                  | 10 mph wind<br>Max                 |                  | 15 mph wind<br>Max                 |                  | 20 mph wind<br>Max                 |                  |
|------------------------------|---------------|------------------------------------|------------------|---------------------------------------|------------------|------------------------------------|------------------|------------------------------------|------------------|------------------------------------|------------------|
| °C<br>(Approx.)              | °F (Approx.)  | Work<br>Period                     | No. of<br>Breaks | Work<br>Period                        | No. of<br>Breaks | Work<br>Period                     | No. of<br>Breaks | Work<br>Period                     | No. of<br>Breaks | Work<br>Period                     | No. of<br>Breaks |
| -26 to -28                   | -15 to -19    | (Norm.<br>Breaks)                  | 1                | (Norm.<br>Breaks)                     | 1                | 75 min                             | 2                | 55 min                             | 3                | 40 min                             | 4                |
| -29 to -31                   | -20 to -24    | (Norm.<br>Breaks)                  | 1                | 75 min                                | 2                | 55 min                             | 3                | 40 min                             | 4                | 30 min                             | 5                |
| -32 to -34                   | -25 to -29    | 75 min                             | 2                |                                       |                  | 40 min                             | 4                | 30 min                             | 5                | Non-emergency work<br>should cease |                  |
| -35 to -37                   | -30 to -34    | 55 min                             | 3                | 40 min                                | 4                | 30 min                             | 5                | Non-emergency<br>work should cease |                  | Non-emergency work<br>should cease |                  |
| -38 to -39                   | -35 to -39    | 40 min                             | 4                | 30 min                                | 5                | Non-emergency<br>work should cease |                  | Non-emergency<br>work should cease |                  | Non-emergency work<br>should cease |                  |
| -40 to -42                   | -40 to -44    | 30 min                             | 5                | Non-emergency<br>work should<br>cease |                  | Non-emergency<br>work should cease |                  | Non-emergency<br>work should cease |                  | Non-emergency work<br>should cease |                  |
| -43 and below                | -45 and below | Non-emergency<br>work should cease |                  | Non-emergency<br>work should<br>cease |                  | Non-emergency<br>work should cease |                  | Non-emergency<br>work should cease |                  | Non-emergency work<br>should cease |                  |



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## Cold Stress Learn the Signs

| Illness  | Signs & Symptoms   | Recommended Actions  |
|--|--|--|
| <p><b>Dehydration</b><br/>Usually occurs when the body's output of water is greater than the body's input</p>  | <ul style="list-style-type: none"> <li>-Thirsty</li> <li>-Lightheadedness</li> <li>-Muscle cramps</li> <li>-Headache</li> </ul>  | <ul style="list-style-type: none"> <li>-Drink water or sports drinks that contain electrolytes</li> <li>-Drink to quench thirst</li> </ul>   |
| <p><b>Mild hypothermia</b><br/>Usually occurs when the core body temperature drops between 98-90 F</p>   | <ul style="list-style-type: none"> <li>-Shivering</li> <li>-Lack of coordination, stumbling, fumbling, hands</li> <li>-Slurred speech</li> <li>-Memory loss; and/or</li> <li>-Pale, cold skin</li> </ul>   | <ul style="list-style-type: none"> <li>-Move to warm area</li> <li>-Stay active</li> <li>-Remove wet clothes and replace with dry clothes or blankets and cover head</li> <li>-Drink warm (not hot) sugary drink</li> </ul>  |
| <p><b>Moderate Hypothermia</b><br/>Usually occurs when the core body temperature drops between 90-86 F</p>   | <ul style="list-style-type: none"> <li>-Shivering stops</li> <li>-Unable to walk or stand</li> <li>-Confused and irrational</li> </ul>   | <ul style="list-style-type: none"> <li>-All of the recommended actions for mild hypothermia plus the following:</li> <li>-Call 911 for an ambulance Cover all extremities completely</li> <li>-Place very warm objects, such as hot packs or water bottles on the victim's head, neck, cheek, and groin</li> </ul>                 |
| <p><b>Severe Hypothermia</b> Usually occurs when the core body temperature drops between 86-78 F</p>   | <ul style="list-style-type: none"> <li>-Severe muscle stiffness</li> <li>-Very sleepy or unconscious</li> <li>-Ice cold skin</li> <li>-Death</li> </ul>  | <ul style="list-style-type: none"> <li>-Call 911 for an ambulance</li> <li>-Treat the victim very gently</li> <li>-Do not attempt to re-warm</li> </ul>  |
| <p><b>Frostbite</b><br/>Usually occurs when the skin actually freezes and loses water when temperatures are below 30 F. Wind chill factor can allow frostbite to occur in above freezing temperatures.</p> | <ul style="list-style-type: none"> <li>-Cold, tingling, stinging or aching feeling in the frostbitten area followed by numbness</li> <li>-Skin color turns red, then purple, then white or very pale</li> <li>-The skin is cold to the touch</li> <li>-Blistering in severe cases</li> </ul> | <ul style="list-style-type: none"> <li>-Call 911 for ambulance</li> <li>-Do not rub the area</li> <li>-Wrap frostbitten area with a soft cloth</li> <li>-If help is delayed, immerse area in warm (not hot) water. Do not pour water on affected area</li> <li>-Apply sterile dressings to blisters to prevent breaking</li> </ul> |
| <p><b>Trench Foot</b><br/>Usually occurs by having feet immersed in cold water for long periods of time. Similar to frostbite but less severe.</p>   | <ul style="list-style-type: none"> <li>-Tingling, itching or burning sensation</li> <li>-Blisters may also be present</li> </ul>   | <ul style="list-style-type: none"> <li>-Soak feet in warm (not hot) water</li> <li>-Wrap with a soft dry cloth or bandage</li> <li>-Drink a warm sugary drink</li> </ul>   |
| <p><b>Chilblains</b><br/>Painful inflammation of small blood vessels as a response to sudden warming from cold temperatures</p>  | <ul style="list-style-type: none"> <li>-Red itchy patches of skin</li> <li>-Swelling and blistering on extremities</li> <li>-Burning sensation on skin</li> <li>-Changes in skin color from red to dark blue</li> </ul>  | <ul style="list-style-type: none"> <li>-Chilblains will usually go away on its own, making treatment not a necessity</li> <li>-Keep the area warm</li> <li>-Use antiseptic to help reduce the chance of infection</li> </ul>   |