

COLD EXPOSURE (Wind Chill) *Revised 02/2008*

Temperature is a measure of the heat of a substance. When the forecaster tells you how warm or cold it is going to be outside, he or she is generally referring to the temperature of the air close to the surface of the Earth. But temperature alone will not tell you how cold you'll feel when you get outside-especially if there is a wind blowing!

Any warm object, like a human being, will lose heat when it is exposed to cold air. The greater the wind speed, the faster the object will lose heat. The difference between people and inanimate objects is that we feel or *sense* the heat loss. A temperature we feel is called a sensible temperature. You've probably noticed that some days feel colder than others when there is a strong wind blowing, even if the temperatures are the same! This phenomenon is known as *wind chill*. To estimate the heat loss based on temperature and wind speeds, we use the Wind Chill Index. Wind chill is referred to as an equivalent or sensible temperature, since it is not an *actual* temperature.

Why should we care about wind chill? A lower wind chill can increase the rate at which certain cold-weather dangers, such as frostbite and hypothermia can develop. There are precautions that we can take to avoid them when outside in extreme weather, such as wearing proper clothing and using appropriate equipment. You can also check yourself regularly for wet or cold areas on your body while outside in extreme weather, or use the buddy system to look for signs of danger and re-warm body parts as needed. Here are some of the conditions that can lead to hypothermia:

°Cold temperatures °Wetness °Improper dress/equipment °Exposed skin
°Poor food intake °Prolonged exposure

The severity of hypothermia can vary, depending on how low the core body temperature gets. There are specific signs and symptoms to look for. The condition worsens as the core body temperature lowers.

Mild Hypothermia (core body temperature ranges from 99-95 degrees Fahrenheit):

- Involuntary shivering
- Inability to perform complex motor functions (such as skiing)

Moderate Hypothermia (core body temperature ranges from 95-90 degrees Fahrenheit):

- Slurred speech
- Violent shivering
- Dazed consciousness
- Irrational behavior (for example, the person may begin undressing and is unaware of being cold)
- Loss of fine motor coordination

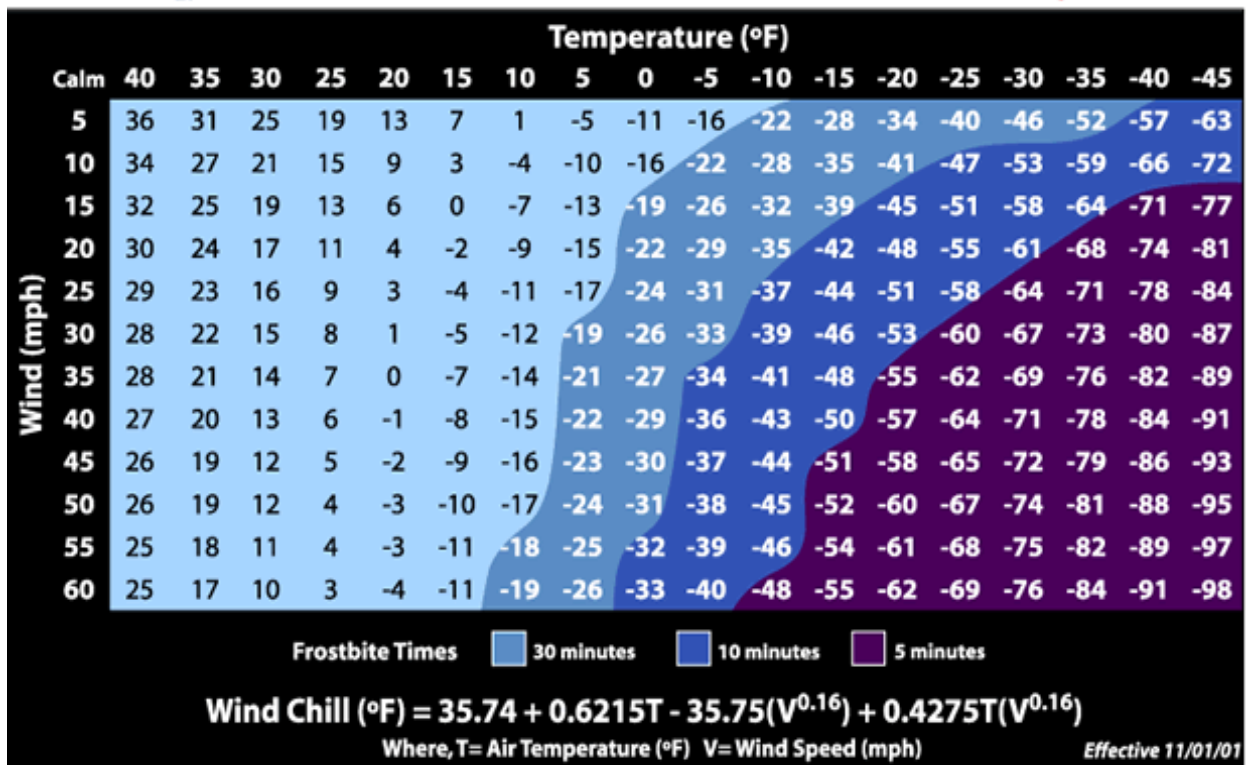
Severe Hypothermia (core body temperature ranges from 90-75 degrees Fahrenheit):

- Pupils are dilated
- Skin is pale
- Pulse rate decreases
- Muscle rigidity develops

- Shivering occurs in waves, it is violent and then pauses; the pauses eventually grow longer and longer until shivering ceases
- Person falls to the ground and cannot walk; may curl into a fetal position to conserve heat
- Person loses consciousness, heartbeat and respiration are erratic
- Cardiac and respiratory failure, then death



NWS Windchill Chart



	Air Temperature (° Fahrenheit)		
Wind Speed	45	40	35
5 (mph)	42	36	31
10	40	34	27
15	38	32	25
20	37	30	24
25	36	29	23
30	35	28	22
35	35	28	21

To find out the specific Wind Chill on days not indicated on the above charts, a simple calculator can be found online at <http://www.nws.noaa.gov/om/windchill/index.shtml>.

Cold Exposure Guidelines

In cold weather temperatures proper layered clothing should be worn and encouraged by Athletics department staff and coaches. These include:

- Several layers around the core of the body, especially for those individuals that are not very active.
- Long pants designed to insulate. Cotton sweatpants (brownies) are excellent. On very cold days a nylon shell or wind pant can be worn on top of them for additional wind break.
- Long sleeve shirt/sweatshirt/coat designed to insulate and break the wind.
- Gloves
- Ear protection/Hat or helmet.
- Face protection.
- Wicking socks that do not hold moisture inside. Wool is excellent. Cotton absorbs and holds in moisture.

Clothing should be *layered* to allow adjustments as activity level may increase and decrease within a practice which may elevate or drop body temperature. The first layer of clothing should wick sweat and moisture away from the body. Equipment managers can identify what clothing works best for this. You may have already been issued an excellent product that will act as a wick. The top layers should act as insulators to trap heat and block wind.

The following temperature guidelines have been established for intercollegiate teams during cold weather. Cold weather is defined as any temperature that can negatively affect the body's regulatory system. These do not have to be freezing temperatures! The following guidelines have been established for High School and Collegiate Athletics practice and event participation.

Outside participation limited to 45 minutes:

Temperature or wind chill, which ever is lower, reaches **25° F**. Frostbite can occur in 30 minutes or less!

Termination of outside participation:

Temperature or wind chill, which ever is lower, reaches **15° F**.

In addition to the above guidelines it is recommended that additional directives are given to student athletes.

- Cold exposure/activity requires more energy from a body. Additional calorie intake may be required.
- Cold exposure/activity requires similar hydration to room temperature; however, the thirst reflex is not activated. Conscious efforts before and after practice to hydrate should be initiated.
- **Never train alone.** A simple ankle sprain in cold weather may become life threatening!
- **Student athletes should be instructed on signs of cold stress** (wind chill, frostbite and hypothermia). Fatigue, confusion, slurred speech, red or painful extremities, swollen extremities, blurred vision, red watery eyes, dizziness, headache, numbness, tingling of skin and extremities, shivering, uncontrollable shivering etc. are a few warning signs of cold stress.

Note: Information is compiled from United States Military handbooks and NOAA (National Oceanic and Atmospheric Administration). For more information about Cold Exposure Guidelines please contact Jason Jarinko at Geisinger Sports Medicine.