frostbite are the nose, cheeks, ears, fingers and toes, so avoid leaving areas of the skin exposed to the cold and wind. The initial symptoms of frostbite usually include:

- An uncomfortable sensation of coldness and pain, followed by numbness
- Tingling, stinging, aching, or cramping pains, which may be felt at first, but then subside
- Skin changing color to white or grayish-yellow, progressing to reddish-violet, and finally turning black
- Affected area is cold and numb
- Blisters

Hypothermia is the lowering of the body's core temperature to abnormal levels. The initial symptoms of hypothermia usually include:

- Uncontrollable shivering, and sensation of cold
- Vague and slow, slurred speech
- Memory lapses
- Drowsiness

An employee experiencing any of the initial symptoms of frostbite or hypothermia must immediately move to a warm location and notify her or his supervisor. If the symptoms worsen or additional symptoms appear, the employee should immediately seek medical attention.

Getting Assistance

For additional information about working in cold environments, see Safety Policy and Procedure Manual section S30.70.1 “Personal Protective Equipment--Working in Cold Environments”, or contact your WSU Environmental Health and Safety office. You can also check the Centers for Disease Control web site at http://www.cdc.gov/niosh/topics/coldstress

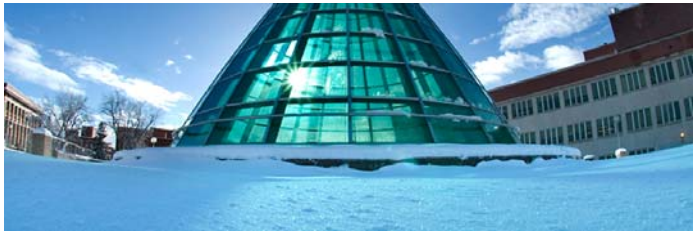
Environmental Health & Safety
P.O. Box 641172
Pullman, WA 99164-1172
(509) 335-3041

Wenatchee 509-663-8181
Tri-Cities 509-372-7163
Vancouver 360-546-9706
Spokane 509-368-6699

http://www.ehs.wsu.edu

Environmental Health and Safety

Consulting Training Service

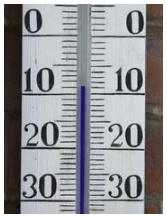


Extreme Cold:

Preventing Frostbite and Hypothermia

WASHINGTON STATE UNIVERSITY
World Class. Face to Face.

Whenever temperatures drop decidedly below normal and as wind speed increases, heat can leave your body more rapidly. These weather-related conditions may lead to serious health problems.



Dress Warmly and Stay Dry

When the weather is extremely cold, and especially if there are high winds, try to stay indoors. If you must go outside, make trips as brief as possible, and wear:

- a hat
- a scarf or knit mask to cover face and mouth
- sleeves that are snug at the wrist
- gloves or mittens
- water-resistant coat and boots
- several layers of loose-fitting clothing

Be sure the outer layer of your clothing is tightly woven, preferably wind resistant, to reduce body-heat loss caused by wind. Wool, silk, or polypropylene inner layers of clothing will hold more body heat than cotton.

Stay dry—wet clothing chills the body rapidly. Excess perspiration will increase heat loss, so remove extra layers of clothing whenever you feel too warm.

Also, avoid getting gasoline or alcohol on your skin while de-icing and fueling your car or using a snow blower. These materials in contact with the skin greatly increase heat loss from the body.

Do not ignore shivering. It's an important first sign that the body is losing heat. Persistent shivering is a signal to return indoors.

Avoid Exertion

Cold weather puts an extra strain on the heart. If you have heart disease or high blood pressure, follow your doctor's advice about shoveling snow or performing other hard work in the cold. Otherwise, if you have to do heavy outdoor chores, dress warmly and work slowly. Remember, your body is already working hard just to stay warm, so don't overdo it.

- Avoid perspiring or becoming overtired.
- Carefully watch for signs of cold-weather health problems.

Avoid Ice

Walking on ice is extremely dangerous. Many cold-weather injuries result from falls on ice-covered sidewalks, steps, driveways, and porches. Keep your steps and walkways as free of ice as possible by using rock salt or another chemical de-icing compound. Sand may also be used on walkways to reduce the risk of slipping.

Understand Wind Chill

The Wind Chill index is the temperature your body feels when the air temperature is combined with the wind speed. It is based on the rate of heat loss from exposed skin caused by the effects of wind and cold. As the speed of the wind increases, it can carry heat away from your body much more quickly, causing skin temperature to drop. When there are high winds, serious weather-related health problems are more likely, even when temperatures are only cool.

The Wind Chill Chart below shows the difference between actual air temperature and perceived temperature, and amount of time until frostbite occurs.

Frostbite and Hypothermia

Frostbite is caused by the freezing of the fluids around the cells of body tissue. Areas of the body most vulnerable to

Wind Chill Factor

Actual air temperature °F

	calm	40	30	20	10	0	-10	-20	-30	-40
Apparent temperature										
Wind speed (mph)	10	34	21	9	-4	-16	-28	-41	-53	-66
	20	30	17	4	-9	-22	-35	-48	-61	-74
	30	28	15	1	-12	-26	-39	-53	-67	-80
	40	27	13	-1	-15	-29	-43	-57	-71	-84
	50	26	12	-3	-17	-31	-45	-60	-74	-88
	60	25	10	-4	-19	-33	-48	-62	-76	-91

Frostbite times: 30 minutes | 10 minutes | 5 minutes