# By the Numbers: Cold Stress

**DID YOU KNOW?**

When working outdoors in cold weather or working in artificially cold environments, such as refrigerated areas, serious cold-related injuries and illnesses may occur. Cold related hazards can cause permanent tissue damage or even death.

When the body is unable to warm itself, cold related stress may result.

Four contributing factors:

- Cold Air Temperatures
- High Velocity Air Movement
- Dampness of the Air
- Contact with Cold Water or Surfaces

Wind chill is the combination of air temperature and wind speed. For example, when the air temperature is 40º F. and the wind speed is 35 mph, your exposed skin receives conditions equivalent to the air temperature being 11º F. While it is obvious that below freezing conditions combined with inadequate clothing could bring about cold stress, it is also important to understand that it can also be brought about by temperatures in the 50’s coupled with some rain and wind.

**What are the most common cold induced problems?**

**Hypothermia**

Hypothermia occurs when body heat is lost faster than it can be replaced. When the core body temperature drops below the normal 98.6ºF to around 95ºF, workers experience an onset of symptoms.

The following sets out the stages of hypothermia in people as their temperatures drop from normal.

**Mild**

98º – 86º F

- Shivering
- Lack of coordination
- Stumbling
- Fumbling
- Fumbling hands
- Slurred speech
- Pale, cold skin

**Moderate**

90º – 86º F

- Shivering
- Reduce breathing
- Unable to walk/stand
- Confusion
- Irrationality

**Severe**

86º – 78º F

- Muscle stiffness
- Very sleepy
- Unconscious
- Extremely cold skin
- Irregular pulse
- Difficult to find pulse

**KEEP IN MIND**

Hypothermia is the most severe cold injury. The excessive loss of body heat could be fatal. Warning signs can include nausea, fatigue, dizziness, irritability or euphoria, pain in the extremities and severe shivering.

The **toes**, **fingers**, **ears** and **nose** are at greatest risk because the do not have major muscles to produce heat. **Mental alertness** is also reduced.

- **Chilblain** – redness, swelling, tingling and pain.
- **Frostnip** – caused when top layers of skin freeze, turning white, numb and hard, but deeper tissue feels normal.
- **Frostbite** – occurs when tissue temperature falls below the freezing point or when blood flow is obstructed; symptoms include inflammation of the skin in patches and slight pain.
- **Immersion foot/Trench foot** – caused by prolonged wet or cold feet; symptoms include tingling, numbness, itching, pain, swelling, and blisters.

Workers need to maintain a core body temperature of +37 ºC (+98.6 ºF) for normal body functioning as well as to provide energy for activity.

**Employers** should:

- Choose equipment with thermal insulating materials and tools that can be operated with gloves.
- Survey and monitor the temperature.

- Train managers, supervisors and workers on symptoms, safe work practices, re-warming procedures, proper clothing practices, and what to do in case of cold injury.
- Clearly outline emergency procedures, with at least one trained person available at all times.
- Use a buddy system to watch for symptoms in others.
- Adjust the pace or rate of work (not to low that a person becomes cold, nor to high and cause heavy sweating or wet clothing).
- Allow time for new workers to become accustomed to the conditions.
- Provide or make sure that protective clothing is worn at or below 4ºC, including layers of warm clothing, with an outer layer that is wind-resistant, a hat, mittens or insulated gloves, a scarf, neck tube or face mask, and insulated, waterproof footwear.