Winter. Just the word is enough to bring tremors to some. Bone-chilling cold air, bitter winds that take your breath away, and the always-frustrating winter precipitation. Regardless of where you live, winter is a colder time of year; that we can all agree on. Winters are vastly different in Kansas, Arizona, and New York. Areas around the country are used to diverse definitions of cold. What all areas have in common are the same meteorological factors that play into the cold weather. Before heading out for the day, you can check the weather almost anywhere; television, computer, smartphone application, or the radio.

Meteorologists at the National Weather Service (NWS) will issue an official alert if necessary, based on meteorological data. Even if no alerts are issued, hazards could still exist for your job. Outdoor jobs vary in many ways and can expose workers to hazardous conditions on a typical day. Once the weather is factored in, extra precautions must be taken. When a body gets exposed to cold, its exterior temperature starts to decline followed quickly by its interior temperature. Keeping track of weather conditions, especially temperature and wind, is imperative when working outside.

As mentioned in the blog entry about Heat Stress, heat is the amount of energy an object has. The transfer of heat when two objects come into contact with each other depends on the temperature, or measurement of energy, of both objects. The larger the difference in temperature, the quicker the heat will flow. Think of how warm you get immediately after you put on a hot shirt fresh out of the dryer. Heat will always transition from a warmer object to a colder object to balance a temperature difference, if one exists. This explains why heat is lost, or drawn out, from your body during the cold.

Both temperature and wind are equally important factors during cold weather. Frigid temperatures can be more bearable if the wind is calm, under 3 mph. When the wind picks up, especially out of the north, our body heat can be lost quicker. The temperature could be teetering around freezing (32°F) and if a strong northerly wind moves in, it could send temperatures plummeting; thus, increasing the risk for cold stress. If precipitation is involved, temperature and wind can be crucial in making the difference between rain, freezing rain, and snow. The NWS created a chart to easily review wind chill factor during certain outdoor conditions.

The [NWS Wind Chill chart](https://www.weather.gov/safety/cold-wind-chill-chart) is useful to review as a guide to cold weather. It depicts the wind chill value at a certain temperature with a specific wind speed. These calculations are based on a typical height of 5 feet, which is an average height for an adult human face. If you’re tall with your face higher than 5 feet and you go outside without face protection, this chart may not provide exact data for your situation. This chart can be beneficial, but we need to understand what wind chill actually is.

Wind chill describes the rate that body heat is lost due to a combination of low temperatures and wind speed. It’s sometimes described as the “feels like” temperature. While it’s a useful tool to predict the rate at which exposed skin loses heat and is more prone to frostbite risk; it has a high degree of variability. Earlier in this post, I mentioned how different geographical areas have different definitions of cold. If a person has acclimated to frigid temperatures where they live, they are likely able to withstand colder temperatures better than a visitor from a warmer place. Since temperature can vary quite a bit during the day, just as the wind can, wind chill values can change frequently. Wind chill doesn’t take into consideration impact from sunlight. Adding the sun’s impact can assist in keeping the body warm due to solar radiation. These values can also vary depending on your location and whether you’re walking in the sun or in the shade. These aspects are all important when considering wind chill.

Let’s make something clear. Wind chill is not the actual air temperature combined with the wind, nor will exposed skin’s temperature decrease to the wind chill value. An object can only cool to the temperature within its environment, due to a heat imbalance as mentioned above. Take water for example. If water is placed in a cup outside where the air temperature is 32°F and the wind chill is 5°F, the temperature of both the cup and the water inside will cool down to 32°F. If you place hot water in a cup outside in the same conditions, it will freeze quicker but still will only reach 32°F. (As an aside, this is why I fill my ice cube trays with hot water, to get ice quicker!) This may seem complicated, but the bottom line is that if you don’t dress warm in cold weather, your body heat won’t last long. There are many variables to consider when dressing for cold weather.

Keeping ourselves warm has a lot to do with the clothes we wear. Two words to live by in cold weather: Layer up! Multiple layers allow for heat to stay in and cold to stay out. Having the ability to remove a layer, if you’re sweating too much, is also beneficial. A base layer will absorb your sweat and evaporate it into the next layer without losing body heat. Multiple insulating layers will keep your body heat in while moisture is able to escape. Your outer layer should ideally be waterproof and will deflect the cold air, biting winds, and precipitation. This goes for the upper and lower parts of your body; hands, feet, and head included. A significant amount of body heat is lost through a person’s head, regardless of how much hair they have. During the frigid winter, dressing for warmth can easily mean wearing a balaclava (ski mask), a stocking cap, 4 shirts, 2 pairs of pants, 2 pairs of socks, a pair of gloves, and a pair of mittens as well as some coveralls and a coat. Just like in a severe weather situation, put as many barriers as possible between you and the elements. Quality is just as important as quantity when it comes to winterwear.

One type of material that will do no favors in the cold is cotton. Once it gets wet, the moisture won’t go away anytime soon causing body heat to be lost quicker. Instead, opt for wool or fleece. Moisture-wicking fabric will absorb and evaporate moisture fast, which is ideal for a base layer so the sweat you generated is removed but not your body heat. Wool material is helpful due to its fiber makeup because moisture is evenly distributed throughout the material and evaporates, but always feels dry. Fleece is a great insulator and will help maintain your body heat. Every person who works outside has their own theory on what works best for their job. If you have something that works well for your particular industry, let us know so we can share that information with others.

In addition to wearing the right type and amount of clothing, personal risk factors play a vital role when working outside. Personal risk factors include physical fitness, age, and underlying health conditions such as diabetes or hypertension. Every person’s tolerance is different and can vary based on their own personal risk factors. When conditions are borderline extreme, don’t push yourself or your teammates too hard. Frequent breaks in a warm area for the entire team should be a standard practice for supervisors. Even though not everyone will feel the need to take breaks, it is crucial to observe if someone from your team is nearing a medical emergency due to cold stress.

Extreme cold working conditions can bring increased risks of cold stress. Continued exposure to wet or damp conditions during exhaustive outside work in cold weather will only exacerbate the body’s reaction. Cold stress on the body can result in severe health problems, and in some cases can cause death. Removing a person from the cold when they’re suffering from cold stress is critical. Take the person to a warm place, even if it’s a running vehicle with the heater going. Always stay with a victim of cold stress until medical personnel arrive. Be aware of yourself and your team for any symptoms and take the appropriate action immediately.

**Trench Foot** or **Immersion** can occur on feet that are exposed to wet and cold conditions for an extended period of time. Wet feet can lose heat quicker than dry feet. This is a non-freezing injury that can occur in temperatures up to 60°F if feet are consistently wet.

* What to watch for:
  + Reddening skin
  + Tingling or pain
  + Swelling
  + Leg cramps
  + Numbness
  + Blisters
* What to do:
  + Remove wet shoes and socks.
  + Dry wet feet.
  + Elevate feet and avoid walking.
  + If serious, call 911 and seek medical attention.

**Frostbite** is caused by freezing of exposed skin and is a medical emergency. It can cause permanent damage and may require amputation in severe cases. People who are not dressed properly for extreme cold are most at risk, along with people with reduced blood circulation.

* What to watch for:
  + Red skin developing gray or white patches
  + Blisters
  + Tingling or aching skin
  + Loss of feeling
* What to do:
  + Call 911 – follow their advice.
  + Protect the affected area by wrapping loosely with dry cloth.
  + Provide a warm drink if the person is conscious.
  + Leave affected area alone; do not rub or break skin or attempt to heat.

**Hypothermia** is a serious medical emergency. It takes place when the body’s heat is lost faster than it can be replaced. Body temperature falls below 95°F and can impact the brain, making a victim unaware of what’s happening. This can also occur at temperatures above 40°F if a person gets cold from sweat, being submerged in cold water, or precipitation.

* What to watch for:
  + Shivering
  + Fumbling hands
  + Confusion or memory loss
  + Exhaustion
  + Drowsiness
  + Slurred speech
* What to do:
  + Call 911 – follow their advice.
  + Get to a shelter or warm place.
  + Remove wet clothing.
  + Warm the body with dry blankets around chest, neck, or head – do not cover face.
  + Provide a warm drink if the person is conscious.

Maintaining hydration is important, even if you don’t feel thirsty. Exerting yourself outside during cold conditions can cause dehydration and exhaustion because your body is working harder to maintain its temperature while performing work duties. Drinking warm drinks in addition to water and electrolyte drinks will aid in maintaining body heat and hydration. If possible, rescheduling a job to a safer and warmer time can make a difference. Getting a job done on time is important, as is maintaining client satisfaction. However, no part of a job is worth risking the health and safety of your team.

It’s the supervisor’s duty to have a cold weather plan. Frequent breaks in a dry, warm location allow for the body to warm back up once it’s been exposed to extreme cold. If possible, provide heaters or hand/foot warmers for your teams working outside. Even creating some type of stable block from the wind can make a significant difference. Working in pairs will allow for everyone to watch out for their teammates for signs of cold stress. Having an extra pair of gloves, socks, or a hat stored in your vehicle may come in handy.

Providing water for your team is helpful, as is having a first aid kit. If you have a first aid kit, great job! If you don’t, now is the time to get one. A few beneficial items to add to your first aid kit would be hand/foot warmers, towels, blankets, or electrolyte powder drink mix.

If you’re a supervisor who would like some ideas on a cold safety plan or have questions on where to find quality first aid kits, contact iSi.