We’ve all said or heard them before. Classic sayings like: “It’s a scorcher out there!” or “It’s hot enough to fry an egg on the sidewalk!” or “It’s so hot, my sweat is sweating!”. Hot weather conditions, like the sayings, are typically inevitable, especially for those who work outside. Multiple meteorological factors play into hot weather extremes and how they make you feel when you’re outside. These factors can be easily monitored using a computer, phone application, radio, or television.

Meteorologists at the National Weather Service (NWS) will issue an official alert if necessary, based on meteorological data. If no alerts are issued by the NWS, hazards may still exist for your job. Various outdoor professions like builders, concrete masons, landscapers, and firefighters all work outdoors and have different duties in diverse settings. Some professions regularly utilize equipment that can produce a significant amount of heat. Although professions vary, all are impacted by the same meteorological factors that can create hazardous conditions during hot weather. These hazardous conditions primarily include the meteorological factors of temperature and relative humidity.

When dealing with weather, like many sciences, aspects are complex and can get complicated quickly. There’s no reason these aspects can’t be simplified. Instead of using loads of esoteric meteorological jargon like *hydrostatic equilibrium* that serves little-to-no use in average daily conversations, let’s simply review a few terms before we go any further. It’s always good to learn something new, right?

**Relative Humidity** is a ratio of the amount of moisture in the air compared to the maximum amount of moisture air could have, expressed as a percentage. It is not a measure of actual moisture in the air.

**Temperature** is a measurement of the average kinetic energy of molecules in an object. It’s used to measure the amount of heat an object has.

**Heat** is the amount of energy within an object and is transferred between objects in response to differences in temperature. Energy always transitions from a warmer object to a colder object. Heat transfer occurs in three ways:

* Conduction – Molecules coming in contact (or colliding) with each other.
  + Hot ground heats up objects it encounters (rocks, air, etc.).
  + Touching a hot handle of a boiling pot of water.
* Convection – Molecules with varying energy levels (temperatures) are mixed and eventually balance at the same energy level (temperature). Typically occurs within liquids or gases.
  + Warm air rises up in the atmosphere, cools, and then turns into a cloud.
  + Putting a mixture of cold and warm water into a pot to boil.
* Radiation – Molecules are exposed to a high level of electromagnetic waves.
  + Rays from the sun increase the heat of the ground.
  + Heat from a stovetop burner increases the heat of a pot of water.

You get into your car on a hot summer day. You burn your hand on the hot steering wheel (conduction) that is hot due to the sun’s rays coming through the windshield (radiation) and even though your drink from lunch wasn’t in the sun, it’s no longer cold due to the ice melting in your cup (convection).

As heat intensifies due to various heat transfer methods, the air temperature rises. High temperatures are harsh and increase our body temperature. In order to regulate body temperature and rid ourselves of heat, we sweat and that sweat evaporates. When there’s a breeze in the air, the wind will evaporate our sweat quicker. When you include an elevated level of relative humidity during high temperatures, the air feels heavy which also makes it more difficult to evaporate sweat and regulate body temperature. Relative humidity is a value that varies based on temperature and moisture content in the air and can fluctuate throughout the day, just as temperature can. For example, if the air temperature is 85°F, having a relative humidity of 30% feels completely different than a relative humidity of 80%. The NWS created a chart to assist in reviewing various temperature and relative humidity combinations.

The [NWS Heat Index chart](https://www.weather.gov/safety/heat-index) is a useful tool. It’s an easy-to-read chart depicting the heat index level at a certain temperature with a specific level of relative humidity. This chart considers light winds and some cloud cover. However, since that’s not always a realistic scenario depending on your location, a note states that full sun exposure with very few clouds can increase heat index values by up to 15°F. Another helpful tool to use is the [Heat Safety Tool](https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html) application for smartphones which calculates the heat index either based on your location or specific data you enter. This application was jointly created by several regulatory agencies including OSHA, NIOSH, and the CDC. Keeping track of weather conditions is crucial when making decisions.

What is the heat index? Everyone has more than likely heard of it, especially if you work outside. This is a calculated value that tells us how it really feels at certain temperature and relative humidity values. It’s sometimes described as the “apparent temperature”. There are four risk levels associated with the various heat index values: Lower (<91°F), Moderate (91°F – 103°F), High (103°F – 115°F), and Very High to Extreme (>115°F). A higher risk level means more measures need to be taken to protect your team. OSHA has a practical [website](https://www.osha.gov/SLTC/heatillness/heat_index/) dedicated to heat index. The website includes handy resources and checklists you can review regardless if you’re an employer or part of a working team. While you can’t control the weather, you can make simple decisions that play a major role in how you feel physically when working outside, such as what clothes to wear.

Regulating body temperature is imperative to keeping cool, pun intended. As we all know when our body gets hot, we sweat. What keeps us cool while we’re sweating is when our sweat evaporates. Different clothing material can assist in regulating body temperature by absorbing and evaporating sweat. Cotton is common, absorbs moisture well, and is lightweight when dry. Synthetic moisture-wicking fabric absorbs and evaporates moisture quickly and is also lightweight. Surprisingly, even wool material is beneficial due to its fiber makeup. As wool absorbs moisture it’s evenly distributed throughout the material and eventually evaporates, but always feels dry to the touch. This is not an endorsement for a particular fabric, as each of these have good and bad qualities. 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.

Along with clothing, personal risk factors are important to consider during extreme heat. This includes any underlying health conditions, age, and physical fitness. Every person is different and their tolerance could be higher or lower based on their personal risk factors. Don’t push yourself or others if conditions are near extreme. Supervisors should insist on frequent breaks in the shade during hot days for the entire team. While some people may not feel the need to take frequent breaks, they are beneficial for your body and help in regulating body temperature. It’s vital to notice if someone on your team needs a break and is close to requiring medical attention due to heat illness.

Hot working conditions can bring increased risks of heat illness, especially when heat-producing equipment is used. The most important thing to remember about a person suffering from heat illness is to get them out of the heat ASAP. Take them to a shaded or air-conditioned area. A running vehicle with air conditioning works if no shaded area is available. Always stay with a victim of heat illness until medical personnel arrive. Be aware of yourself and your team for any symptoms and take the appropriate action immediately.

**Heat rash** can appear on skin as small or large clusters of red bumps.

* What to do:
  + Get to a cool, dry place.
  + Keep rash dry; use powder to soothe.

**Heat cramps** bring pain or spasms to muscles.

* What to do:
  + Halt physical activity until cramps go away.
  + Get to a cool place.
  + Drink water or electrolyte drink.
* Seek medical attention if the victim:
  + Has cramps lasting longer than 1 hour.
  + Has heart problems.
  + Is on a low-sodium diet.

**Heat exhaustion** occurs when the body’s temperature can’t cool down. Think of this as a situation where extreme conditions *exhaust* the body. It is severe and can occur in one day or over multiple days when in a consistently hot environment.

* Watch for:
  + Heavy sweating
  + Cold, clammy, pale skin
  + Fast and weak pulse
  + Nausea or vomiting
  + Headache
  + Weakness or tiredness
  + Dizziness
  + Fainting
  + Muscle cramps
* What to do:
  + Get to a cool place.
  + Loosen clothing.
  + Sip water; do not chug.
  + Place cool cloths or cold packs under arms or on neck.
* Seek medical attention if the victim:
  + Is vomiting.
  + Experiences worsening symptoms.
  + Experiences symptoms lasting longer than 1 hour.

**Heat stroke** occurs when body temperature is excessively high. Think of this as a situation that causes the body to *stroke* or seize up completely. This is a serious medical emergency that can cause shock, brain damage, organ failure, and death. It could be caused by heat exhaustion that was not properly treated.

* Watch for:
  + Red, hot, dry skin (no sweating)
  + Fast and strong pulse
  + Nausea
  + Throbbing headache
  + High body temperature
  + Dizziness or confusion
  + Slurred speech
  + Losing consciousness
  + Seizures
* What to do:
  + Call 911 – follow their advice.
  + Get to a cool place.
  + Loosen clothing.
  + Place cool cloths or cold packs under arms or on neck.
  + Do not provide anything to drink.

Dehydration can be a common cause of heat illness. Maintaining hydration is important, even if you don’t feel thirsty. Drinking water or electrolyte drinks are highly preferred to sugary and heavily caffeinated drinks. OSHA recommends drinking small amounts of cool water often before getting thirsty; 4 cups every hour during heat index values between 103°F – 115°F. Another recommendation is not to exceed 12 quarts of water per day.

An important reminder is that every person and situation is different. Some people require more water than others. These intake amounts depend on several things including the type of work being done, how much you’re sweating, and your personal risk factors. Don’t chug a large amount of water in the morning and call it good for the day; the important thing is *maintaining* hydration. You don’t flood your vegetable garden once at the beginning of the month and neglect it the rest of the month. If you do, you probably don’t have much of a harvest.

It’s the supervisor’s duty to have a plan in place during days of extreme heat. If possible, rescheduling a job to a cooler day or even a cooler part of the day could 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 and clients should understand that.

It’s every person’s duty to watch out for themselves and their teammates. Providing cold water for your team is beneficial during hot days, as is having a first aid kit. If you have a first aid kit, kudos! If you don’t have a first aid kit, now is the time to get one. A few beneficial items to add to your first aid kit would be cold packs, cooling towels, electrolyte/salt tablets, or electrolyte powder drink mix. There are also specific first aid kits that can be purchased that include heat-stress care items.

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