



TOPIC | HEAT STRESS AND RELATED ILLNESS

Workplaces involving heavy physical work in hot, humid environments can put considerable heat stress on workers. Hot and humid conditions can occur either indoors or outdoors.

POTENTIAL HAZARDS / RISKS

- Discomfort
- Lack of awareness
- Dehydration
- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke.

The human body functions best within a narrow range of internal temperature. This "core" temperature varies from 36°C to 38°C. A worker performing heavy work in a hot environment builds up body heat. To get rid of excess heat and keep internal temperature below 38°C, the body uses two cooling mechanisms:

1. The heart rate increases to move blood—and heat—from heart, lungs, and other vital organs to the skin.
2. Sweating increases to help cool blood and body. Evaporation of sweat is the most important way the body gets rid of excess heat.

When the body's cooling mechanisms work well, core temperature drops or stabilizes at a safe level (around 37°C). But when too much sweat is lost through heavy labour or working under hot, humid conditions, the body doesn't have enough water left to cool itself. The result is dehydration. Core temperature rises above 38°C. A series of heat-related illnesses, or heat stress disorders, can then develop.

[VIDEO / RESOURCE / AID; "Heat Stress in Construction Environments Safety Video Program - www.safetyissimple.com"; view at <https://www.youtube.com/watch?v=oPL3DAccxc>]

SAFEGUARDS | RECOGNIZING HEAT RISKS

Personal Risk Factors

It is difficult to predict just who will be affected by heat stress and when, because individual susceptibility varies. There are, however, certain physical conditions that can reduce the body's natural ability to withstand high temperatures:

- **Weight** Workers who are overweight are less efficient at losing heat.
- **Poor physical condition** Being physically fit aids your ability to cope with the increased demands that heat places on your body.
- **Previous heat illnesses** Workers are more sensitive to heat if they have experienced a previous heat-related illness.
- **Age** As the body ages, its sweat glands become less efficient. Workers over the age of 40 may therefore have trouble with hot environments. Acclimatization to the heat and physical fitness can offset some age-related problems.
- **Heart disease or high blood pressure** In order to pump blood to the skin and cool the body, the heart rate increases. This can cause stress on the heart.
- **Recent illness** Workers with recent illnesses involving diarrhea, vomiting, or fever have an increased risk of dehydration and heat stress because their bodies have lost salt and water.
- **Alcohol consumption** Alcohol consumption during the previous 24 hours leads to dehydration and increased risk of heat stress.



- **Medication** Certain drugs may cause heat intolerance by reducing sweating or increasing urination. People who work in a hot environment should consult their physician or pharmacist before taking medications.
- **Lack of acclimatization** When exposed to heat for a few days, the body will adapt and become more efficient in dealing with raised environmental temperatures. This process is called acclimatization.

Acclimatization usually takes six to seven days. Benefits include lower pulse rate and more stable blood pressure, more efficient sweating (causing better evaporative cooling), improved ability to maintain normal body temperatures.

Acclimatization may be lost in as little as three days away from work. People returning to work after a holiday or long weekend should understand this and allow time to re-acclimatize to work conditions.

Environmental Risk Factors

Environmental factors such as ambient air temperature, air movement, and relative humidity can all affect an individual's response to heat. The body exchanges heat with its surroundings mainly through radiation and sweat evaporation. The rate of evaporation is influenced by humidity and air movement.

- **Radiant Heat** Radiation is the transfer of heat from hot objects through air to the body. Working around heat sources such as kilns or furnaces will increase heat stress. Additionally, working in direct sunlight can substantially increase heat stress. A worker is far more comfortable working at 24°C under cloudy skies than working at 24°C under sunny skies.
- **Humidity** is the amount of moisture in the air. Heat loss by evaporation is hindered by high humidity but helped by low humidity. As humidity rises, sweat tends to evaporate less. As a result, body cooling decreases and body temperature increases.
- **Air movement** affects the exchange of heat between the body and the environment. As long as the air temperature is less than the worker's skin temperature, increasing air speed can help workers stay cooler by increasing both the rate of evaporation and the heat exchange between the skin surface and the surrounding air.

Job-Related Risk Factors

- **Clothing and Personal Protective Equipment (PPE)** Coated and non-woven materials used in protective garments block the evaporation of sweat and can lead to substantial heat stress. The more clothing worn or the heavier the clothing, the longer it takes evaporation to cool the skin. Remember too that darker-coloured clothing absorbs more radiant heat than lighter-coloured clothing.
- **Workload** The body generates more heat during heavy physical work. For example, workers shoveling sand or laying brick in hot weather generate a tremendous amount of heat and are at risk of developing heat stress without proper precautions. Heavy physical work requires careful evaluation even at temperatures as low as 23°C to prevent heat disorders. This is especially true for workers who are not acclimatized to the heat.



SAFEGUARDS | RECOGNIZING HEAT STRESS DISORDERS

Heat Stress Disorder & Description	Treatment
<p>Heat rash—also known as prickly heat—is the most common problem in hot work environments. Symptoms include;</p> <ul style="list-style-type: none"> • Red blotches and extreme itchiness in areas persistently damp with sweat • Prickling sensation on the skin where sweating occurs. 	<ul style="list-style-type: none"> • Cool environment • Cool shower • Dry thoroughly. <p><i>In most cases, heat rashes disappear a few days after heat exposure ceases. If the skin is not cleaned frequently enough, the rash may become infected</i></p>
<p>Heat Cramps - Under extreme conditions the body may lose salt through excessive sweating. Heat cramps can result. These are spasms in larger muscles—usually back, leg, and arm. Cramping creates hard painful lumps within the muscles.</p>	<ul style="list-style-type: none"> • Stretch and massage muscles. • Replace salt by drinking commercially available carbohydrate or electrolyte replacement fluids.
<p>Heat exhaustion occurs when the body can no longer keep blood flowing to supply vital organs and send blood to the skin to reduce body temperature at the same time. Signs and symptoms of heat exhaustion include</p> <ul style="list-style-type: none"> • Weakness • Difficulty continuing work • Headache • Breathlessness • Nausea or vomiting • Feeling faint or actually fainting. 	<p>Heat exhaustion casualties respond quickly to prompt first aid. If not treated promptly, however, heat exhaustion can lead to heat stroke—a medical emergency.</p> <ul style="list-style-type: none"> • Call 911. • Help the casualty to cool off by resting in a cool place • Drink cool water • Removing unnecessary clothing • Loosen clothing • Showering or sponging with cool water. <p><i>It takes 30 minutes (at least) to cool the body down once a worker becomes overheated and suffers heat exhaustion.</i></p>
<p>Heat stroke occurs when the body can no longer cool itself and body temperature rises to critical levels. WARNING: Heat stroke requires immediate medical attention.</p> <p>The primary signs and symptoms of heat stroke are:</p> <ul style="list-style-type: none"> • Confusion • Irrational behaviour • Loss of consciousness • Convulsions • Lack of sweating • Hot, dry skin • Abnormally high body temperature—for example, 41°C. 	<p>For any worker showing signs or symptoms of heat stroke,</p> <ul style="list-style-type: none"> • Call 911. • Provide immediate, aggressive, general cooling. Immerse casualty in tub of cool water or <ul style="list-style-type: none"> ○ Place in cool shower or ○ Spray with cool water from a hose. ○ Wrap casualty in cool, wet sheets and fan rapidly. • Transport casualty to hospital. • Do not give anything by mouth to an unconscious casualty. <p>WARNING: Heat stroke can be fatal even after first aid is administered. Anyone suspected of suffering from heat stroke should not be sent home or left unattended unless that action has been approved by a physician. <i>If in doubt as to what type of heat-related disorder the worker is suffering from, call for medical assistance.</i></p>

DISCUSSION WITH GROUP

- **How** 'hot' is your workplace?
- **What** control measures are in place?
- **How** do you control your personal exposures to heat (at work and off-work)?
- **What** can you do if you (or a co-worker) are suffering from the onset of a heat related illness?
- **What** can you do if you witness a heat related emergency (i.e. child or pet in a car)?