Heat Stress

What is Heat Stress?

Overexposure to heat can stress the body's cooling system. When the heat is combined with other stresses such as hard physical work, loss of fluids, fatigue or some medical conditions, it may lead to heat-related illness, disability and even death.

Heat stress – the overloading of the body's cooling system – can happen to anybody even if you are young and fit. In Ontario heat stress is usually a concern during the summer. This is especially true early in the season, when people are not used to the heat.

Some industries or operations involving high air temperatures, radiant heat sources from molten materials, high humidity, direct physical contact with hot objects or strenuous physical activities have a potential for heat stress all year round. These include iron and steel foundries, brick firing and ceramic plants, glass product facilities, rubber products factories, bakeries, laundries, smelters and steam tunnels.

How We Cope With Heat

Normal body temperature is 37° Celsius (98.6° Fahrenheit). This temperature must remain constant for the body to work well. When body heat increases, the body removes heat through the skin. Blood vessels near the skin open up to bring more warm blood to the surface. Heat then escapes and the body cools. When the air temperature is high, the main source of cooling is the evaporation of sweat. However, when the humidity is high, sweat does not evaporate as quickly and has little or no cooling effect. The hotter or more humid the environment, the harder your body must work to get rid of its excess heat.

If the air is moving (for example, from fans) and it is cooler than your body, it is easier for your body to pass heat to the environment.

Workers over the age of 40 should be more careful because of a reduced ability to sweat.

Controlling Heat Stress

Acclimatization

The more you work in the heat, the better your body becomes at keeping cool. If you are not used to working in the heat you must take a week or two to get acclimatized or used to it. If you are away from work for a week or so you can lose your acclimatization.

There are two ways to acclimatize:

1) **Limit your time in the hot environment.**

   If you are experienced on the job, limit your time in the hot environment to 50% of the shift on the first day, 60% on the second day and 80% on the third day. You can work full shifts from the fourth day on. If you are not experienced on the job (for example, a summer student), you should start of spending 20% of the time in the hot environment on the first day and increase your time by 20% each day after this.

2) **Limit the physical demands of the job.**

   Instead of reducing the exposure times to the hot job, you can become acclimatized by reducing the physical demands of the job for a week or two.

   If you have health problems or are not in good physical condition, you may need more time to acclimatize.

   Hot spells in Ontario seldom last long enough to allow acclimatization. When it is hot, consider some of the following types of controls.

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Modifying Work and the Environment

There are three main ways to control heat stress: engineering controls, administrative controls and personal protective equipment.

Engineering Controls

- Use insulating and reflective barriers to control heat at the source (e.g., insulate furnace walls).
- Exhaust hot air and steam produced by specific operations.
- Reduce the temperature and humidity through air cooling.
- Provide air-conditioned rest areas.
- Increase air movement by providing fans for spot cooling (Important Note: If the air temperature is above 35° Celsius (95° Farenheit), improving air movement may increase a workers risk of heat stress. When the air temperature exceeds 35° Celsius, air movement can decrease our body's natural cooling mechanisms and this may increase the heat load on the body through convective heating. Refer to the PPE section for additional information).
- Reduce the physical demands of work tasks with mechanical devices (e.g., use hoists, lift-tables, etc).

Administrative Controls

- Assess the demands of all jobs and have monitoring and control strategies in place for hot days.
- Increase the frequency and length of rest breaks.
- Schedule hot jobs to cooler times of the day.
- Caution workers to avoid direct sunlight when outdoors
- Provide cool drinking water near workers and remind them to drink a cup every 20 minutes or so.
- Develop a hot weather plan to alert workers about environmental triggers such as a heat waves or the Humidex reaching or exceeding 35° Celsius.
- Assign extra workers or slow down the work pace.
- Make sure workers are properly acclimatized.
- Train workers to recognize the signs and symptoms of heat-related conditions. (Use the chart on the next page to help.) Also, start a "buddy system" as people are not likely to notice their own symptoms.
- Pregnant workers and workers with medical conditions should discuss working in the heat with their doctor.

Personal Protective Equipment

- Wear light, summer clothing (where suitable) to allow air to flow freely and sweat to evaporate. When the air temperature exceeds 35° Celsius, wearing a layer of light loose fitting clothes made of breathable fabric can reduce the risk of heat stress caused by conductive heating.
- If working outside, cover up with light-coloured clothing, hat, sunglasses and sunscreen with a sun protection factor (SPF) of at least 15.
- When there is an inside radiant heat source wear reflective clothing.
- For very hot environments, consider air, water or ice-cooled insulated clothing.
- Vapour barrier clothing, such as acid suits, greatly increases the amount of heat stress on the body. Extra caution is needed.

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Heat Related Conditions

	Signs and Symptoms	Cause	Treatment	Prevention
Heat Rash	Red, bumpy rash with severe itching.	Hot humid environment; plugged sweat glands.	Change into dry clothes and avoid hot environments. Rinse skin with cool water	Wash regularly to keep skin clean and dry.
Heat Cramps	Painful cramps in arms legs or stomach that occur suddenly at work or later at home. Cramps are serious because they can be a symptom of more dangerous heat-induced illnesses.	Heavy sweating drains a person's body of salt, which cannot be replaced just by drinking water.	Move to a cool area; loosen clothing and drink cool salted water* (1 tsp. salt per gallon of water) or commercial fluid replacement beverage. Do not take salt tablets. If the cramps are severe or don't go away, see a doctor.	Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other to help spot the symptoms that often precede heat stroke.
Fainting	Sudden passing out after at least two hours of work; cool moist skin; weak pulse.	Not enough blood flowing to the brain. Fluid loss and inadequate water intake.	Fainting may be due to a heart attack or other illness. GET MEDICAL AID. Assess need for cardiopulmonary resuscitation (CPR). Move to a cool area; loosen clothing; make person lie down; if the person is conscious, offer sips of cool water.	Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other to help spot the symptoms that often precede heat stroke.
Heat Exhaustion	Heavy sweating; cool moist skin; body temperature over 38°Celsius (100° Farenheit); weak pulse; normal or low blood pressure; person is tired, weak, clumsy, upset or confused; is very thirsty; or is panting or breathing rapidly; vision may be blurred.	Inadequate salt and water intake causes a person's body's cooling system to start to break down.	GET MEDICAL AID. This condition can lead to heat stroke, which can kill. Move the person to a cool shaded area; loosen or remove excess clothing; provide cool water to drink (salted if possible); fan and spray with cool water.	Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other help spot the symptoms that often precede heat stroke.
Heat Stroke	High body temperature (over 41°Celsius (106° Farenheit) and any one of the following: the person is weak, confused, upset or acting strangely; has hot, dry, red skin; a fast pulse; a headache or dizziness. In later stages, a person may pass out and have convulsions.	When a person's body has used up all its water and salt; it will stop sweating. This can cause body temperature to rise to a deadly level. May follow heat exhaustion or develop suddenly.	CALL AMBULANCE. This condition can kill a person quickly. Remove excess clothing, fan and spray the person with cool water; offer sips of cool water if the person is conscious.	Reduce activity levels and/or heat exposure. Drink fluids regularly. Workers should check on each other help spot the symptoms that often precede heat stroke.
Sunburn	Red, painful or blistering and peeling skin.	Too much sun exposure.	If blisters appear on the skin seek medical attention. Use skin lotion (avoid topical anaesthetics) and work in the shade.	Work in the shade; cover skin with clothing; apply sunscreen with a sun protection factor (SPF) of at least 15.

Reference: Adapted from: *"Heat Stress", Health and Safety Guidelines, Professional and Specialized Services, Occupational Health and Safety Branch, Ministry of Labour, April 2003.*

* A physician should be consulted if an individual has heart problems or is on a low salt diet.

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Need More Information?

If you have general questions about heat stress, call our Inquires Service at 1 (800) 406-IAPA (4272). For more technical information or if your company is interested in having heat exposure measurements conducted, call 1 (800) 406-IAPA (4272) and ask for an Occupational Hygiene Specialist.

References

"Heat Stress", Health and Safety Guidelines, Professional and Specialized Services, Occupational Health and Safety Branch, Ministry of Labour, April 2003.

"Preventing Heat Stress at Work", WorkSafe BC, 2007 Edition

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