

# SAFEGUARDS



## Information

### HEAT STRESS

#### WHAT IS HEAT STRESS?

Heat stress is the total heat burden that the body is subjected to by both external and internal factors such as:

##### External

- Temperature
- Humidity
- Amount of air movement
- Radiant temperature of surroundings
- Clothing

##### Internal

- Physical activity (metabolic heat load)

Heat stress occurs when the body cannot sufficiently cool itself. For example heat is absorbed from the environment faster than it can be lost via the body's cooling mechanisms. The term 'heat stress' is not a medical condition, however it may be used to describe a range of adverse health effects from heat cramps to heat exhaustion and heat stroke.

#### WHAT ARE THE BODY'S COOLING MECHANISMS?

The body can be cooled by the following means:

- Convection (heat loss to air)
- Radiation (heat loss to surrounding objects)
- Evaporation of sweat

In very hot conditions, sweat evaporation is the only means by which the body can maintain its temperature within the narrow range necessary for healthy functioning. The large amounts of fluid that can be lost by this mechanism must be replaced to prevent dehydration.

#### WHAT HAPPENS IF THE COOLING MECHANISMS ARE INSUFFICIENT?

Several conditions, of varying severity, may occur:

- Weakness, dizziness, fainting (heat syncope)
- Heat cramps
- Heat exhaustion
- Heat stroke

#### ARE SOME PEOPLE MORE LIKELY TO SUFFER THE ADVERSE EFFECTS OF HEAT STRESS?

Those people who are unacclimatised, overweight, physically unfit, suffer from heart diseases, abuse alcohol or take certain medications are at greater risk of the effects of heat stress.

The sweat-evaporating cooling mechanisms of people who are not acclimatised are less efficient than those who are. Therefore, unacclimatised people should build up gradually to a full workload in hot conditions, over a period of a week. Acclimatisation to hot conditions can be rapidly lost if a person has not worked in that environment for a period of time so it is important to repeat the process of gradual return to work in hot conditions.

The efficiency of an individual's cooling mechanisms may vary and consequently their ability to tolerate heat stress.

#### CAN THE LEVEL OF HEAT STRESS BE MEASURED?

Yes, the level of heat stress burden can be measured by various means, including the use of the Wet Bulb Globe Temperature (WBGT) Index. WBGT Tables of work and rest can then give an indication of whether adverse effects of heat are likely to occur with particular activity levels and working conditions. Alternatively a basic Thermal Risk Assessment (provided by the Australian Institute of Occupational Hygienists) can provide guidance in this area.

An occupational hygienist can be useful to assist in more complex assessments. Adequate assessment and implementation of controls will assist in the prevention of the adverse effects of heat stress.

#### HOW CAN THE ADVERSE EFFECTS OF HEAT STRESS BE AVOIDED?

Heat stress can be avoided by decreasing the level of heat exposure, or improving the efficiency of the body's cooling mechanisms. It is important to train workers in the recognition of heat stress symptoms and the mechanisms by which this may be minimised. Risk reduction may be achieved by:

- Altering work schedules so that heavier work is done during cooler periods
- Reducing the radiant heat load by providing shaded areas for outdoor work and shielding from sources of radiant heat for indoor work, such as furnaces
- Increasing convective heat loss by improving air circulation
- Promoting evaporation of sweat by reducing humidity, increasing air movement and wearing suitable clothing
- Providing access to cool drinking water
- Preventing dehydration by ensuring that workers maintain adequate fluid replacement. Salt may be added to fluids but is only required in small amounts when sweating is heavy and continuous. Salt tablets are unnecessary and not recommended as most diets already contain sufficient salt intake.
- Ensuring employees are fit, acclimatised and not taking medication that will impair their ability to cope with heat stress
- Allowing rest periods, if possible, in air-conditioned spaces. This helps in three ways:
  - lowering metabolic heat production
  - decreasing environmental body heat
  - providing an opportunity to increase fluid intake
- Allowing self-regulation of work if fatigue, discomfort or other symptoms occur

## HOW SHOULD ADVERSE EFFECTS OF HEAT STRESS BE TREATED?

Some adverse effects such as heat stroke are very serious and must be regarded as medical emergencies.

If a person appears to be suffering from heat exhaustion:

- Remove them from the heat
- Have them rest in a cool area
- Encourage them to drink cool (not cold) fluids
- Obtain medical assistance.

If heat stroke is suspected (decreased sweating, high temperature, dry hot skin, confusion and loss of consciousness) medical attention is required urgently. First aid may consist of cooling the body by soaking the victim's clothing in cool (not cold) water and promoting gentle air movement by fanning the victim.

## A NOTE ON THERMAL DISCOMFORT

Exposure to hot and cold conditions can result in a spectrum of outcomes that range from mild discomfort to life-threatening medical conditions. Thermal discomfort is at the mild end of the spectrum and is distinguished from the more severe effects of heat and cold stress by the absence of significant potential for adverse medical outcomes.

The temperature range within which employees are comfortable at work varies widely according to factors such as the type of work, the clothing worn, air movement, radiant heat, humidity and individual preferences.

Furthermore, community and employee expectations in terms of thermal comfort are undergoing constant and ongoing change, such as the provision of air-conditioning in cars.

It is therefore difficult to specify industry-wide thermal comfort standards, and individual situations should be considered.

When work is undertaken outside what is generally considered a comfortable temperature range for a particular industry, and as a result there is real potential for adverse health effects from excessive heat or cold, then the issue goes beyond thermal comfort and should be addressed as an occupational health and safety (OHS) matter.

In addition, if the level of thermal discomfort is considered sufficient to significantly increase the risk of accidents, and consequently injury, then a hazard exists and effective hazard management is required.

However, if the level of thermal discomfort is assessed as unlikely to create health risks it could be a matter for industrial negotiation.

Most employers are aware that employee comfort has a significant impact on morale, productivity and quality of work output.

## FURTHER INFORMATION

### *Heat Stress Standard & Documentation Developed for Use in the Australian Environment*

[http://www.aioh.org.au/product\\_pubs.asp](http://www.aioh.org.au/product_pubs.asp)

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**Re-issued** March 2011

**Review** March 2013