



## Information Circular

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**Subject:** **Guidelines for Working in Heat**

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### **Purpose**

To provide information for employers and employees on heat illness, related health and safety problems and actions/measures that can be taken to prevent or mitigate heat illness.

### **Scope**

This document applies to those persons who undertake work in locations where they may be exposed to extreme heat. It is not intended to provide rigid standards for determining whether a particular thermal environment is safe and healthy, rather to provide a guide on how working in hot conditions should be approached.

### **Background**

Exposure to extreme heat in Western Australia is, for the most part, due to the climatic conditions throughout the state. This is particularly relevant to those health service personnel who work outdoors. Exposure to adverse thermal conditions may also result from working in laundries, boiler rooms, and kitchens. All heat injuries are preventable.

*Regulation 3.15* of the Occupational Safety and Health Regulations 1996 states that:

*An employer must ensure –*

- (a) That work practices are arranged so that employees are protected from extremes of heat and cold; and*
- (b) If the workplace is in a building or structure that, as far as is practicable, heating and cooling are provided to enable employees to work in a comfortable environment.*

The thermal environment is a composite of a number of climatic factors including air temperature, air movement, humidity and radiant heat. Thermal comfort is dependent upon an individual's response to temperature and is affected by such factors as:

- level of activity and metabolism
- personal health
- hydration
- medications
- alcohol
- suitability of clothing
- level of acclimatisation
- intensity and length of exposure to adverse conditions.

Taking these factors into account, it is inappropriate to specify a thermal environment that is suitable and acceptable for all individuals.

Apart from the serious direct impacts of heat such as heat stress or heat stroke, which are very rare in industry, working in seasonal heat can affect health and safety in a variety of ways. These include:

- reducing ability to concentrate (leading to increased risk of accidents)
- increasing discomfort when wearing protective clothing and using protective equipment
- aggravating the effects of other hazards such as noise
- aggravating pre-existing illnesses.

Dehydration can also occur unless fluid balance is maintained.

### **Heat stress**

Body temperature is regulated very closely. Over a normal day, if no heavy exercise is done, the internal/core body temperature varies by no more than 0.6<sup>o</sup> Celsius for most healthy people. The body skin temperature can vary over a wide range without adverse effects on performance or health. Heat loss can occur through conduction, radiation or convection of heat and by evaporation of sweat. This last mechanism is the most important in hot conditions, particularly when the ambient temperature exceeds the core body temperature. Evaporation is reduced as the humidity of the surrounding air rises.

Heat stress occurs when the body's temperature regulating centre is unable to cope with heat generated by both the body and the environment. The physical condition of the employee is a very important consideration. Un-acclimatised or obese persons, persons on medication, persons who have consumed excessive amounts of alcohol, unfit individuals and people who have heart conditions, high blood pressure or several other medical conditions may show adverse reactions in conditions that would not normally be of concern.

Common signs of heat stress may include:

- increased sweating (this may not always occur)
- irritability
- muscle cramps
- headache
- nausea and vomiting
- feeling weak
- dizziness
- confusion.

If this should occur the recommended treatment is:

- move to and, if need be, rest in the coolest possible place in an area offering increased air movement
- drink frequent small quantities of cool fluid
- loosen tight clothing
- sponge body down with cool water
- fan to increase air movement
- seek medical attention if no improvement.

### **Returning to work after heat stress**

A worker should generally not return to work on the same shift if they have experienced symptoms of heat stress. However, it is possible to return to work on the same shift if:

- the worker's vital signs return to normal
- the worker has passed a large volume of clear urine
- the worker can be supervised for at least the next 24 hours
- the worker can perform non physically demanding work for the rest of the shift.

## **Heat stroke**

Heat stroke is the most severe form of heat stress and is caused by the failure of the body's temperature regulating mechanism. Signs of heat stroke include those of heat stress plus:

- markedly raised core body temperature ( $>40.5^{\circ}\text{C}$ )
- worsening mental state (disorientation, fainting or having convulsions)
- dry skin (due to a reduced ability to sweat) OR increased sweating.

Heat stroke is a very serious condition and medical attention should be sought as a matter of emergency. First aid measures include:

- cool body down, sponge, wrap in wet sheets and fan
- apply cold packs to armpits, face and back of neck
- give cool, non-alcoholic drinks only if the person is able to take them (do not give alcoholic drinks).

If the person is unconscious, position him/her on the side and clear the airway. If medical attention is delayed, seek further instructions from ambulance or hospital emergency staff.

## **Factors contributing to heat stress**

There are three groups of factors that contribute to the development of heat stress: climatic, personal and physical.

The important climatic factors include:

- dry bulb temperature (air temperature)
- humidity or dew point temperature
- radiant heat (from the sun or sources such as furnaces)
- air velocity (moving dry air will enhance the cooling effect of sweating).

Personal factors contributing to the response of human body to heat conditions include:

- gender
- age
- clothing
- acclimatisation
- physical fitness
- health status
- hydration
- medications.

The type and extent of physical activity and the length of time the activity is undertaken are very important heat stress factors.

## **Protective measures**

To remain healthy, safe and efficient in the workplace, employees should work in a manner and under conditions that prevent heat stress. With indoor workplaces, it may be feasible to maintain a thermally comfortable workplace. With outdoor workplaces, there is minimal control over the thermal environment and close attention should be paid to work schedules, other control measures and to personal protection.

Proper planning can reduce the risk of thermal stress. During periods such as heatwaves in summer, work practices should be reviewed to ensure that the workload is compatible with the physical capabilities of the employees and that work practices are modified to take account of the environmental conditions.

## **Planning and organising work in hot conditions**

In anticipation of hot days, local supervisors/managers, in consultation with health and safety representatives, should consider the following control measures:

- isolation/enclosure of hot processes
- mechanisation of tasks
- use of air circulating fans or similar spot cooling equipment
- maximisation of natural ventilation where practical (e.g. doors, windows, vents)
- use of heat barriers and insulation where appropriate (e.g. the provision of shielding of radiant heat entering windows)
- change in location of work
- split shifts
- rescheduling of heavier work to other days or to cooler periods of the day or year
- change of normal working hours
- rotation of employees engaged in heavier tasks
- provision of more frequent work breaks to shorten exposure time
- change in the rate of work (e.g. taking longer to do the work) - if practical, allow employees to set their own pace of work
- provision of lighter alternate work
- consideration of the individual's physical capabilities when planning work
- provision of cool drinking water
- modification of clothing within limits imposed by safety considerations
- provision of shade areas (outdoor work)
- clearly defining first aid procedures
- avoiding working alone where possible
- adopting a 'buddy' system to promote adequate fluid intake and to watch out for signs of heat illness.

More frequent breaks encourage frequent drinking and reduce the risk of heat stress that may be higher at the end of a long unbroken work period. In considering the range of control options available, priority must be given to eliminating or controlling the hazard at source before consideration is given to the use of personal protective clothing and equipment.

Employees should remain in their general work location when taking additional rest breaks unless, following consultation, agreement is reached to do otherwise. Where it is unreasonable to work due to hot conditions, and it is not possible to control this heat, transfers to another location or task may take place.

### **Mechanical ventilation in hot conditions**

In areas such as workshops, stores, depots and similar large buildings where ceiling height exceeds 2.7m, total cooling will not normally be possible. In these instances, requests for evaluations of cooling should be referred via the Occupational Health and Safety Committee to local managers. Alternatively, where practicable, and agreeable to all parties, spot ventilation or cooling may be used to offset the effects of indoor heat.

### **Personal protective equipment and clothing**

In addition to the requirements listed above, personal protective equipment (PPE) and/or clothing may be required. The provision of adequate and suitable PPE and clothing is the responsibility of the employer. Employees must receive adequate instruction and training in the use and maintenance of such items. Consideration should be given to the following:

- wearing a loose fitting uniform or protective clothing as appropriate for the safe working requirements for the job, to promote good air circulation around the body
- wearing a minimum of loose fitting clothing under protective clothing
- regular drinking of water
- avoidance of smoking.

In addition, for outdoor environments the provision of the following items should be considered by the Occupational Health and Safety Committee:

- a broad brimmed hat and/or neck flap hats (including broad rimmed attachment to safety helmets if applicable);
- sunscreens that provide the maximum protection factor (SPF 30+) for exposed body parts. Such creams need to be regularly applied during the day (every 2 hours); and
- loose fitting, 'breathable' clothing that covers the body as much as possible.

During the hot season or when employees are exposed to additional heat (e.g. around boilers), cool drinking water should be made available to employees. Staff should be encouraged to drink small amounts of water frequently. Cool electrolyte solutions, such as sports drinks, help to replace the sodium, chloride and potassium that are lost through sweating. The use of salt tablets or other similar proprietary products is to be actively discouraged.

### **Acclimatisation**

Acclimatisation is important for newly employed workers but is equally important for workers returning from leave. Proper acclimatisation reduces the chance of workers suffering heat-related illness. Workers returning from leave should be allowed a reasonable period of acclimatisation to reach normal work levels dependent upon climatic, personal and physical factors previously outlined. Workers who usually work in air conditioned environments may not be acclimatised. The nature, type and duration of work tasks undertaken during the acclimatisation period should be agreed following discussions between the employer/supervisor and the employee in consultation with the workplace health and safety representative.

### **Evaluating the thermal environment**

A variety of measurement systems are available to quantify the thermal comfort for personnel. Reliance on dry bulb temperature measurements alone to assess high stress, without considering other climatic, personal and physical factors previously outlined, is inappropriate. The determination of a heat stress index capable of objectively interpreting the range of contributory factors is complex requiring specialist knowledge and monitoring equipment. Such assessments should only be conducted by staff trained in the methodology and interpretation of these indices.

### **Key criteria**

Implementation of the document will include consideration of the following:

- climatic, personal and physical factors
- provision of air conditioning for staff working indoors
- provision of appropriate PPE and clothing to those staff exposed to thermal conditions that may adversely impact on their health and/or well being.

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