

WORK IN

# HOT OR COLD ENVIRONMENTS



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## What is an industry code of practice?

An approved industry code of practice is a practical guide to achieving the standard of safety required by the *Occupational Health and Safety Act 2000 and OHS Regulation 2001* for a particular area of work.

This approved industry code of practice should be followed unless there is an alternative course of action, which achieves the same or better standard of health and safety in the workplace.

An industry code of practice is approved by the Minister for Industrial Relations. It comes into effect on the day the notice of this approval is published in the *NSW Government Gazette* or on the day specified in the Gazette notice.

An approved industry code of practice is designed to be used in conjunction with the Act and Regulation but does not have the same legal force. A person or company cannot be prosecuted for failing to comply with an approved industry code of practice.

However, in proceedings under the Act or Regulation, failure to observe a relevant approved industry code of practice can be used as evidence that a person or company has contravened or failed to comply with the provisions of the Act or Regulation.

A WorkCover Authority Inspector can cite an approved industry code of practice in a direction or in an improvement or prohibition notice, indicating the measures that should be taken to remedy an alleged contravention or non-compliance. Failure to comply with a requirement in an improvement or prohibition notice is an offence.

### **In summary an approved INDUSTRY CODE OF PRACTICE:**

- gives practical guidance on how the required standard of health, safety and welfare can be achieved in an area of work;
- should be followed, unless there is an alternative course of action which achieves the same or better standard of health and safety in the workplace;
- can be used in support of the preventive enforcement provisions of the *Occupational Health and Safety Act*;
- can be used to support prosecutions for failing to comply with or contravening the Act or Regulation.

## Preface

The aim of this code of practice is to assist employers in deciding on appropriate measures to eliminate or control the risks to employees who work in hot or cold environments. It provides practical advice on implementing the requirements of the *Occupational Health and Safety Act 2000* and the *Occupational Health and Safety Regulation 2001*.

### **What is meant by ‘hot or cold environments’? How can heat or cold affect health and safety?**

Many occupations and tasks expose employees to hot or cold working environments. Work outdoors may expose a person to the sun’s radiation, or to wind chill. Work with hot plant (such as a baker’s oven), or in hot surroundings (such as a foundry), also creates the potential for heat-related illness. Workers in refrigerated areas like cool rooms are also exposed to thermal hazards in their working environment.

It is important to distinguish between a condition, which threatens health and safety, and a feeling of discomfort. Terms like *heat stroke* and *hypothermia* refer to serious medical conditions. Hypothermia is where a person gets an abnormally low body temperature as a result of exposure to cold environments; it is a serious condition, which can lead to death. Heat stroke is an uncommon and more severe form of heat illness, which is a medical emergency. It occurs when the body can no longer control the body temperature and it rises to temperatures where mental function is seriously impaired.

*Heat exhaustion* is related to lack of fluids, or a rapid loss of body fluids. *Heat stress* is more serious, and can lead to death. It is more likely to occur in conditions of high humidity, and to affect non-acclimatised persons – that is, those unused to the conditions.

*Thermal discomfort* may be experienced even when there is little likelihood of a medical condition developing.

For example, office workers may feel uncomfortable if their air conditioning is not working to optimum effect in hot weather. While that problem should be addressed (and if air temperatures rise sufficiently, could result in a real risk of heat related illness) it would not usually create a serious threat to health.

Preventive steps should aim to reduce thermal discomfort as much as is practicable, and to develop working conditions and work practices which will not give rise to more serious problems.

## How to use this information

- **What is this code of practice about?**

This code of practice aims to assist you to take action to prevent heat- or cold-related injury or illness from affecting people in your workplace. If you follow the advice set out here, you will be well on the way to complying with your legal obligation to control workplace risks arising from heat or cold. This guidance should be read in conjunction with the OHS Regulation 2001.

- **Who is this code of practice for?**

This code of practice is for employers, managers, health and safety representatives, OHS committee members, employees, unions and employer organisations to assist them to manage risks arising from work in hot or cold environments.

- **When to use this information**

Use this code of practice to assess the effectiveness of your present arrangements for work in hot or cold environments, and to check that all sources of risk have been identified and dealt with. If you are setting up a new business, this code of practice should be your step-by-step guide to establishing a program to manage the hazards arising from work in hot or cold conditions.

## What do the symbols in the Code of Practice mean?



**Assess the risks in your workplace**



**Legal obligations that must be followed**



**Consult and communicate with employees**



**Questions you (or others) might ask to clarify issues**



**Tools that can help you work out your plan**



**The process of finding things that cause harm, working out how big a problem they are and then fixing them**

# Chapter 1 – Establishment

## 1.1 Title

This is the Code of Practice for *Work in Hot and Cold Environments*.

## 1.2 Purpose

This code sets out and explains the requirements for managing risks associated with hot and cold working environments, to ensure the health, safety and welfare of employees when at work. It provides practical guidance on determining what is appropriate for the particular circumstances of each workplace.

## 1.3 Scope

This code of practice applies to all workplaces in NSW, except for work carried out in a mine within the meaning of the coal *Mines Regulation Act 1982* of the *Mines Inspection Act 1901*.

## 1.4 Commencement

This code commences on the date it is published in the *NSW Government Gazette*.

This code was published in the *NSW Government Gazette* on 21 September 2001.

## 1.5 Authority

This is an industry code of practice approved by the Minister of Industrial Relations under section 43 of the *Occupational Health and Safety Act 2000*.

## Chapter 2 – Consultation at the workplace



**Employers are required by the OHS Act 2000 to consult with employees (or their representatives) when taking steps to assess and control workplace risks.**

The information in this code of practice should be used when consulting with employees about the hazards of hot and cold environments. The *Occupational Health and Safety Act 2000* (OHS Act) and the *OHS Regulation 2001* (OHS Regulation) require employers to consult with employees and take into account their views when making decisions that affect their health, safety and welfare. Involving your employees in identifying hazards and solving health and safety problems is an essential step in making your workplace safe and healthy.

### 2.1 What is meant by consultation?

Consultation involves: sharing information with employees; giving them the opportunity to express their views before decisions are made; and, valuing their views and taking them into account.

Consultation is based on recognition that employee input and participation improves decision-making about health and safety matters. Consultation will assist in developing safe systems of work based on the identification of hazards that may be present and the assessment of the risks these hazards might give rise to.

Consultation must occur in the following circumstances:

- When changes that may affect health, safety or welfare are proposed to the:
  - work premises;
  - systems or methods of work; or
  - plant or substances used for work.
- When risks to health and safety arising from work are assessed.
- When decisions are made about the measures to be taken to eliminate or control those risks.
- When introducing or altering the procedures for monitoring those risks.
- When decisions are made about the adequacy of facilities for employee welfare.
- When decisions are made about the procedures for consultation.

Employers must establish an OHS consultation mechanism and need to consult employees about what the consultation arrangements are going to be. Employers must also record the consultation arrangements and publicise them to all existing and new employees.

Readers should refer to WorkCover's *Code of Practice: Occupational Health and Safety Consultation* for detailed guidance regarding employer obligations related to consultation.



## Chapter 3 – How to establish the special needs of your workplace

### 3.1 Managing risks in the workplace



OHS Regulation 2001 requires employers to:

- Identify the hazards
- Assess the risk(s) to the health and safety of persons arising from the hazards.
- Use appropriate control measures to eliminate or control the risk.
- Monitor and review the control measures to ensure on-going safety.

Safety issues may arise when organisations are considering purchasing equipment or substances, developing or changing work systems, and designing or re-modelling the workplace.

These are the key elements of a risk management process and must be undertaken in consultation with the people most likely to be affected such as employees and contractors. It makes sense to consult with workers because these people are likely to be aware of the particular risks at their workplace and may have good ideas about how to eliminate or control the hazards.

To simplify the task, generic risk assessments may be used. Generic risk assessments are assessments covering more than one location or circumstance. These may be used for similar work in several locations or circumstances, where the hazards and risks are comparable, so long as the applicability has been checked for each place or circumstance.

### 3.2 Identifying the hazards

An employer must take reasonable care to identify any foreseeable health or safety hazards, which could harm the employee or other persons in the workplace. The hazards may involve work practices and systems, people, equipment, materials, and environment. Some ways to identify hazards include:

- A walk-through of the workplace. This is a simple visual check, which may be assisted with the use of a floor plan, site plan or map.
- Looking at the way work is conducted.
- Consultation with workers. This is one of the easiest and most effective ways to identify hazards.
- Looking at the workplace records on “near misses”, incidents, accidents and injuries.
- Information supplied by manufacturers and suppliers about the proper use of hazardous substances and plant (for example: Material Safety Data Sheets and Product Labels).
- Using the knowledge of an outside expert.

It is a good idea to list the hazards, identify the form in which the hazard occurs, where it occurs, things that contribute to the hazard, and the persons likely to be exposed to the hazard. This can be used to develop a safety plan and can help in developing safe operating procedures.

### 3.3 Assessing the risks

Risk assessment involves considering the:

- risks that any identified hazard can cause to an employee or other person in the work place;
- likelihood of an injury or illness occurring;
- likely severity of any injury or illness that may occur.

In doing this employers should also read any available health and safety information related to the hazard; identify the factors that might contribute to the risk; and identify the actions necessary to control the risk.

Employers should think about:

- the potential sources of heat or cold;
- the number of people involved;
- the type of work to be performed;
- the work practices in use;
- the type of plant, machinery and equipment to be used;
- the premises and working environment including their layout or condition; and,
- the capability, skill, experience and age of people doing the work.

Risk assessment must be done in consultation with employees. It is a good idea to document the risk assessment. You should make a list of the potential injuries and diseases that can occur, and list them from the most to the least serious for example “death by freezing” to “fatigue”. The most serious risks are the ones that should be dealt with first.

The *WorkCover NSW Code of Practice for Risk Assessment* can also help you with assessing your needs.

### 3.4 Eliminate or control the risk

This step involves working out how to eliminate or control the risks. Employers must eliminate any risk to the health and safety of all employees or other persons at the workplace. If it is not reasonably practicable to eliminate the risk the employer must control the risk. The employer is responsible for ensuring risks are controlled, and that the method of control is working.

The “hierarchy of controls” is listed in terms of levels. You should select controls from the highest level possible:

- Level 1. Eliminate the risk** – for example, discontinue the activity, think about using a different, less dangerous piece of equipment, fixing faulty ventilation, or using safer materials or chemicals.
- Level 2. Control the risk** – if you can’t eliminate the risk think about redesigning the equipment or processes so that less hazardous equipment or materials may be used.

Control the risk, by:

- (a) substituting the hazard giving rise to the risk with a hazard that gives rise to a lesser risk, such as changing the plant or the way work is done to something safer or modifying the way work is done or the plant to make it safer;
- b) isolating the hazard (eg. introduce a restricted work area);
- c) using engineering controls (eg. ventilation, exhaust ducting, thermostats).

**Level 2. Other controls** such as:

- (a) administrative controls and safe work practices (eg. specific training and work instructions);
- b) personal protective equipment (eg. insulated gloves, warm clothing or face shields). Personal protective equipment (PPE) is the least preferred way of dealing with hazards, but should be used when the other methods are simply not practical or feasible. Make sure the PPE is appropriate, fitted correctly, maintained in good condition and always used correctly. Workers should be trained not only in how to use it correctly, but also in how to look after it.

The control measures at Level 1 give the best result and should be adopted where practicable. The measures at the lower levels (eg. Level 3) are less effective and they require more frequent reviews of the hazards and the systems of work. In some situations a combination of control measures may need to be used.

Any new control measures should be evaluated to ensure that they are effective and safe and that they create no new hazards. Also, develop clear work procedures and make sure they are documented and available to employees.

### 3.5 Keeping your workplace safe – monitor and review

OHS risk management is an ongoing process. It is a pivotal part of overall business management and just like other business activities must be checked and reviewed. To ensure that a workplace stays safe an employer must review the risk assessments undertaken and the control measures implemented. This will occur whenever:

- there is evidence that the risk assessment is no longer valid;
- an injury or illness occurs; or
- a significant change is planned to the place of work, work practices, or work procedures.

In these circumstances, the process of identification, assessment and deciding control measures must be repeated. Where a safety plan is updated, workers affected by the change must be consulted and informed of new requirements. This is part of a continuous improvement process, which is fundamental in assuring health, and maintaining safety.



You must follow the three steps of identification, assessment and elimination or control for every health and safety issue that requires attention. For work in hot or cold environments, this method provides a systematic way of working out the most effective action to control all possible risks.

## Chapter 4 – Identify your workplace exposures to heat and cold



The first step is to identify the sources of heat and cold. You should look at the work environment, the plant used, and work processes and practices.

The effects of heat and cold on the body are influenced by environmental factors including:

- **Air temperature** how hot or cold the surrounding air is;
- **Humidity** the moisture content in the air;
- **Air movement** including air speed (or wind speed), and air circulation;
- **Radiant heat** heat radiating from the sun, or emitted by plant, buildings, fixtures or processes.

Other things can magnify the effect of these factors. For example by themselves, high or low air temperature, or humidity, will not necessarily present a serious hazard at work. However, if they are present during strenuous physical work, or if the worker is required to wear heavy protective clothing, the potential for harm may be greatly increased.

Look at the workplace itself, and the plant in operation. A tin roof, for example, can transmit considerable radiant heat in hot weather. Inadequate ventilation will increase the effects of heat caused by plant or processes.

Some plant heats up considerably, or becomes very cold during operation. It can generate humidity in the work environment or create a strong movement of hot (or cold) air.

Think about your **work processes**. Are people exposed to risk through:

- the physical activities they perform (eg. increased risk because of a high work rate in hot conditions, or low work rate in cold conditions)?
- their proximity to hot or cold plant or substances?
- the surroundings (work environment) in which they are located?

Think also about the **people** who will do the work. In Section 5.1 (d) you will find some of the *personal* factors that may increase the risks people face when working in hot or cold environments.

The sources of heat or cold, nature of the work and duration of exposure, will also be considered in more depth when you assess the risks. For now, the key step is to ensure that you have *identified all the hazards* to which people may be exposed.

Tool 1 (follows) is a guide to identifying hazards and the possible effects of exposure. The combination of factors and conditions outlined in Tool 1 should be considered in managing exposures to heat and cold.



## Tool 1 – Work in Hot or Cold Environments Exposures to Heat and Cold and Possible Effects

Hazard	Typical exposures	Possible effects
<b>High air temperature</b>	Outdoor physical work in hot weather (eg. road construction). Indoor physical work in a hot working environment (eg. foundry, bakery).	Discomfort, sweating, flushed skin, fatigue, dizziness, muscle cramps, nausea, vomiting, dehydration, and excessive or erratic pulse. <b>Severe exposure:</b> heat stroke, hyperthermia, loss of consciousness, death.
<b>Low air temperature</b>	Prolonged exposure to low air temperatures while wearing clothing inadequate for cold conditions. Outdoor work in cold weather, indoor work in cold environments.	Discomfort, shivering, loss of motor coordination, slurred speech. <b>Severe exposure:</b> irrational behaviour, frostbite, hypothermia, loss of consciousness, death.
<b>Humidity</b>	Work with plant or processes, which generate humidity (eg. brick curing, steam presses).	Discomfort, flushed skin, sweating, fatigue, headaches, dizziness, nausea, vomiting, excessive or erratic pulse. <b>Severe exposure:</b> collapse, heat stroke, hyperthermia.
<b>Air movement (high)</b>	Prolonged outdoor activity in cold, wet and windy conditions, work in wet clothing in cold wind.	(In cold conditions) discomfort, shivering, cold-related illnesses. <b>Severe exposure:</b> hypothermia, loss of consciousness.
<b>Air movement (low)</b>	Work in enclosed area with inadequate ventilation during hot weather.	(In hot conditions) discomfort, flushed skin, sweating, fatigue, headaches, dizziness and excessive or erratic pulse. <b>Severe exposure:</b> nausea, vomiting, collapse, heat stroke.
<b>Radiant heat</b>	Exposure to UV radiation from the sun, exposure to radiant or conducted heat from plant (dryer, oven, furnace) or processes such as smelting, molten metals.	Discomfort, sweating, fatigue, dizziness, nausea and vomiting, radiation burns to exposed skin. <b>Severe exposure:</b> severe burns, heat stroke, collapse, loss of consciousness.

*This Tool is not a comprehensive guide to work in hot or cold environments. It provides examples of typical situations in which exposure to heat and cold occurs, and some of the effects, which may result.*

**Note:** that some of the “possible harmful effects” listed may be considered as creating discomfort for the person affected, rather than any serious (or potentially serious) medical condition.

You must ‘stocktake’ your own workplace hazards to be sure you have identified all the sources of heat and cold to which people may be exposed. Your risk assessment will consider how serious a problem each one could create.

# Chapter 5 – How serious could your heat or cold related problems be?



## 5.1 Factors to consider

Before you decide how to eliminate or control the risks for work in hot or cold environments, you should look at the following five assessment factors:

### (a) The source of the heat or cold

What working conditions expose employees to heat or cold?

- Work in direct sunlight in hot weather (eg. bitumen laying, construction). The risks increase when combined with high temperatures, high humidity and low air movement.
- Work requiring high physical work rate in humid conditions (eg. laundries, kitchens).
- Work in cold weather (eg. horticulture, power line maintenance). The risks increase when combined with low temperatures, wet and windy conditions.
- Plant which becomes hot (eg. ovens, dryers, furnaces) or cold (eg. freezers).
- Workplace with inadequate temperature control or ventilation.

### (b) The nature of work undertaken

The risk assessment should consider how the work being done interacts with (or generates) hot or cold conditions. For example:

- Work in close proximity to sources of heat or cold (eg. metal forging).
- Work in hot conditions (eg. smelter, boiler room, asbestos removal) requiring protective clothing that inhibits loss of body heat.
- Work in cold conditions where loss of body heat may affect body function (eg. occupational diving, garden maintenance in wet weather).
- The interaction of other hazards with hot or cold conditions: (eg. work in confined spaces, where limited ability to move about could increase the effects of heat or cold).

### (c) The duration of exposure to heat or cold

Risks to health and safety will be influenced by the length of time workers are exposed to heat or cold. In particular, the following should be considered:

- Work activity requiring prolonged physical exertion in high temperatures or high humidity.
- Work activity requiring prolonged physical inactivity in low temperatures or wet conditions.

### (d) The physical condition and capability of the worker



**An employer must ensure that appropriate work and rest regimes relative to the physical fitness, general health, medication taken and body weight of each employee exposed to heat or cold are implemented.**

Work in hot and cold environments should be planned so that the needs of individual employees are considered.

While none of the following factors need exclude a person from doing the work, any one of them may trigger special consideration of the worker's needs when assessing heat- or cold-related risks:

- Does the person have any physical or medical health conditions that make them more likely to be affected by heat or cold? (Sensitivity to privacy may be important when collecting or using this type of information).
- Have they recently taken any medication, drugs or alcohol that may make them more likely to be affected when working in hot or cold environments? (Sensitivity to privacy is important when collecting or using this type of information).
- Are they experienced in, and acclimatised to, the working conditions?
- Have they ever suffered a reaction to work in hot or cold environments?
- What level of physical activity is required by the work?
- Are there adequate breaks from particular tasks or rotated duties to avoid heat-or cold-related problems?
- Have I taken sufficient steps to reduce risks to workers or should I undertake more comprehensive monitoring or implement a work-rest regime? Refer to section 6.1.3 for further information.

#### **(e) Past experience of problems arising from work in hot or cold environments**

You should look at all information that may indicate that there have been instances of heat stress, hypothermia or similar problems. This would include:

- Incident data – claims and incident reports.
- Documented complaints or problems arising from work in hot or cold conditions.



**Remember: assessing the potential risks from exposure to hot or cold conditions must be undertaken in consultation with the employees concerned. Employees must also have input into the risk controls selected.**

## **5.2 Measurement**

Having considered the factors outlined above, you may need to establish a clearer picture of potential problems. If the assessment indicates those hot or cold environments present a risk greater than just discomfort, the extent of that risk should be measured.

There a range of ways to measure temperature, these are:

### **Measurement in degrees Celsius by a Dry Bulb thermometer**

The measurement in degrees Celsius that we see in weather reports is simply air temperature, measured by a Dry Bulb thermometer. It does not provide a basis for assessing the potential risks from heat exposure.

### **Effective Temperature using a Wet Bulb thermometer**

The combined effects of *temperature, humidity and air movement* can be described on a single scale. This is the *Effective Temperature*. Generally, an effective temperature between 18 and 24 degrees Celsius is considered satisfactory for most working situations. Effective Temperature is calculated using a Wet Bulb thermometer (one whose bulb is cooled by evaporation).

Effective Temperature, however, is not enough to establish the level of risk when there are significant radiant heat loads. These are better measured by a Wet Bulb Globe thermometer that absorbs radiant heat.

### **Wet Bulb Globe Thermometer (WBGT) Temperature**

The most comprehensive heat stress index is measured by WBGT. WBGT takes into account the factors likely to be significant *in combination* in their effect upon a person performing work in hot conditions.

The following factors interact with each other to determine the level of heat-related risks for a worker:

- Environmental conditions (air temperature, radiant heat, humidity).
- Physical work to be done (eg. strenuous or light physical work).
- The way the work is organised (such as its duration, or times of day).
- Clothing which must be worn in order to do the work (eg. heavy protective clothing).

The use of a heat stress index is valuable in that it allows us to accurately measure or monitor conditions. There are established international standards for work in hot and cold environments that are based upon WBGT temperature. For further information refer to the international standard ISO 7243 (1989) (E) Hot environments – Estimation of the heat stress on working man, based on the WBGT- index (wet bulb globe temperature) and the American Conference of Governmental Industrial Hygienists (ACGIH), (2001), “Threshold Limit Values for Chemical Substances and Physical Agents”.

### **Core temperature, heart rate or mean sweat rates**

These can be used when measuring an individual’s physical and physiological response. Core temperature, heart rate or mean sweat rate measurements are used in situations where personal monitoring is required, for example where there is extreme radiant heat or where there is moderate physical labour combined with high radiant heat such as work near furnaces.

## **5.3 Secondary risks of work in hot or cold environments**

Prolonged exposure to heat or cold can lead to fatigue, lowered concentration, slowed reflexes and loss of physical coordination. Any one of these things increases the possibility of an injury occurring. If an employee should faint as a result of heat stress, for example, there is the possibility of an injury from falling or striking objects.

Vibration from tools and equipment also presents increased risk to the operator in cold conditions. As air temperature drops, risks arising from tools that cause significant hand-transmitted or whole body vibration may be increased.

Workers must be able to function efficiently both physically and mentally to sustain work practices that will not place them at risk. If exposure to heat or cold leads to fatigue or discomfort, this could impair decision-making and affect the ability to follow safe working procedures.



## Chapter 6 – Putting your information into action: controlling risks of work in hot or cold environments

Having assessed the workplace conditions and risks, action must now be taken to ensure that heat and cold related risks are controlled. Listed below are steps to consider when looking at the situation in your workplace.

Every workplace is different, and these risk controls may or may not be the right ones for you.

Risk controls that address the source of a health and safety problem will always prove most effective. If exposure to heat or cold can be reduced without relying on procedures and the use of PPE, control efforts are likely to prove more effective.



**Employers have legal responsibilities to implement risk control measures to safeguard employees against harm arising from heat or cold while at work.**

### 6.1 Hot environments

The best way to control body temperature in hot environments is to encourage the evaporation of sweat from the surface of the body. Evaporation is highest when humidity is low and the air movement is high.

If any worker experiences significant symptoms of heat stress, corrective action must be taken and assistance must be provided without delay, regardless of any temperature reading.

#### 6.1.1 Steps to consider for outdoor hot conditions

- Provide and encourage the use of mechanical aids (such as tractors, forklifts, electric saws, mechanical lifters).
- Provide shade where possible, at least for rest periods.
- Monitor temperature, humidity and workers' physical response to environmental conditions.
- Inform and train employees to recognise symptoms of heat-related illness.
- Allow workers to acclimatise to hot conditions over a period of time.
- Provide frequent rest breaks and/or rotate duties to allow people to cool down. Consider work-rest regimes.
- Schedule heavy work and tasks that require the wearing of personal protective equipment (PPE), for cooler times of day (or year).
- Provide fluids and encourage workers to make up for body fluid lost through sweating. A useful "rule of thumb" is that workers should drink at least half a litre of water each hour if hot environments result in excessive sweating.
- Provide a fresh water supply for washing and external cooling eg. wet towels.
- Develop first aid and emergency procedures – and make sure they are understood.

### 6.1.2 Steps to consider for indoor hot conditions



**An employer must ensure that adequate ventilation and air movement is provided in indoor environments that may become hot.**

- Provide and encourage the use of mechanical aids (such as tractors, forklifts, electric saws, mechanical hoists).
- Isolate workers from heat sources.
- Remove heat by exhausts or other sources to the outside of the building.
- Ventilate the work area to provide a flow of cool (or cooled) air. This is particularly important where hot work processes generate radiant heat or high humidity.
- Use fans to circulate airflow (eg. overhead ceiling fans).
- Reduce heat from plant and processes as far as possible by insulating plant, pipes, walls or roofs to minimise radiant heat.
- Monitor temperature, humidity and workers' physical response to environmental conditions.
- Organise the work so those tasks requiring greater physical exertion or that require the wearing of personal protective equipment (PPE) are undertaken in cooler periods within the working shift. Also, provide rest breaks.
- Rotate work in hot conditions to limit the exposure of individual employees.
- Inform and train employees to recognise symptoms of heat-related illness.
- Develop first aid and emergency procedures – and make sure they are understood.
- Provide ready access for employees to fluids and encourage workers to make up for body fluid lost through sweating. A useful “rule of thumb” is that workers should drink at least half a litre of water each hour if hot environments result in excessive sweating.
- Provide PPE for workers exposed to radiant heat and flames such as face shields, appropriate clothing, gloves etc.

### 6.1.3 Applying work-rest regimes to reduce heat risk

If the steps taken to manage hot working conditions have not sufficiently reduced risk to workers, then more comprehensive monitoring of the contributing factors should be undertaken. This monitoring should be used to determine what corrective actions should be taken including short breaks, rotating duties, the use of a work-rest regime as part of additional risk controls, or reviewing the effectiveness of existing work-rest regimes.

When establishing a work-rest regime the level of physical activity required and whether the worker has already been acclimatised to the heat conditions are important factors. The rest periods will increase as heat stress factors increase.

There are established international standards that set out the rest periods that should be built into each hour for work in hot and cold environments.

For further information refer to the following:

- International standard ISO 7243 (1989) (E) Hot environments – Estimation of the heat stress on working man, based on the WBGT-index (wet bulb globe temperature).
- American Conference of Governmental Industrial Hygienists (ACGIH), (2001), “Threshold Limit Values for Chemical Substances and Physical Agents”.

## 6.2 Cold environments



**An employer must ensure that employees exposed to cold have adequate access to heated or sheltered work areas and warm clothing or other personal protective equipment.**

Warm clothing is clothing that is suitable for the purpose of:

1. working in artificially cold workplaces such as refrigerated areas; or
2. working outside in extreme climatic conditions such as those experienced in alpine zones or where there is a need to be protected against environmental conditions (eg. underwater work).

### 6.2.1 Recognise the 'early warning' signs of cold-related illness

Work involving cold can lead to physical discomfort without meaning you are at risk of a more serious condition developing. However, you must be aware of the early warning signs of hypothermia, and take appropriate action if you experience them – or if you observe another person who appears to be in difficulty.

The warning signs to watch for are:

- Hands become numb
- Shivering is not under voluntary control
- Loss of fine motor co-ordination (particularly in your hands – you may have trouble with buttons, laces, zips)
- Slurred speech
- Difficulty in thinking clearly
- Irrational behaviour – sometimes a person will even begin to discard clothing

Once more than one of these signs has been experienced or observed, you should stop work and take steps to safeguard health. For outdoor work, this could mean seeking shelter, finding an external heat source, putting on extra layers of clothing, replacing wet clothing with dry, increasing your physical activity.

### 6.2.2 Steps to consider for outdoor cold conditions

- Provide protection from wind and rain – a shelter, such as a hut or the cabin of a vehicle, will offer relief from extreme conditions.
- Monitor environmental conditions, and the physical well being of people when work involves prolonged or repeated exposure to cold.
- Cease work if conditions become too cold to continue safely. Wind chill can create significant risk even if the air temperature is above freezing point.
- Inform and train employees, so they will recognise unsafe conditions arising from exposure to cold while working outdoors.
- Develop first aid and emergency procedures, and make sure they are understood.

- Provide appropriate protection through warm clothing. Clothing should be worn in light, loose fitting layers; a waterproof outer layer will provide protection from rain. A hat will significantly reduce heat loss, as will ear protection. Slip-resistant, insulated boots are preferable to light footwear which may allow the feet to become wet. Gloves or mittens should also be considered.
- Monitor the use of tools that cause significant hand-transmitted or whole body vibration as they present an increased risk to the operator in cold conditions (see section 5.3).

### 6.2.3 Steps to consider for indoor cold conditions

- Isolate workers from sources of cold.
- Raise the air temperature in the workplace by providing heating.
- Insulate ceiling spaces and walls where possible to minimise heat loss.
- Eliminate draughts (though not at the expense of adequate ventilation).
- Organise work to minimise risk: provide breaks, rotate or 'share' work in cold conditions to limit the exposure of individual employees, organise work-rest regimes.
- Provide training about the hazards and their risk controls.
- Ensure that employees are suitably clothed to work in cold conditions.

### 6.2.4 Applying work-rest regimes to reduce risk

If the steps taken to manage cold working conditions have not sufficiently reduced risk to workers then more comprehensive monitoring of the contributing factors should be undertaken. This monitoring should be used to determine what corrective actions should be taken including the use of a work-rest regime as part of additional risk controls.

Appendix 3 (Work in Hot Environments – Sample Risk Control Plan – Bakery) provides an example of the way in which risk controls can be developed from your assessment of risk factors.



When decisions are made about what actions are to be taken, these should be documented to make subsequent review of agreed risk controls easier. This sample plan gives a simple example of the hazards identified and the actions that have resulted following a risk assessment.



## **Chapter 7 – Who needs to know about the effects of exposure to hot and cold?**

### **7.1 Managers**

Employers should ensure that managers and supervisors understand the effects of exposure to hot and cold conditions, sources of heat and cold in the workplace and work environment, and the steps that must be followed to protect people. Managers and supervisors will be accountable for making sure that preventive measures are implemented, understood by employees, and monitored. Reporting of hazards (and any symptoms of illness) should be encouraged.

### **7.2 Employees**

Employees need to know the potentially harmful effects of heat and cold, and the measures in place for their protection. They must know how to recognise the physical ‘warning signs’ if their health is affected by work in hot or cold conditions, and be encouraged to report these without delay.

Also, consider the needs of employees whose first language is not English, and make sure they understand both the risks and the chosen controls.

### **7.3 Contractors and visitors**

All people who undertake work, or enter the workplace as a visitor, must be made aware of your expectations in regard to their safety. If contractors or visitors could be exposed to heat or cold, their safety must also be ensured.



## **Chapter 8 – Checking that your preventive measures are adequate**

You may already have taken action to manage the risks associated with work in hot and cold environments. It is important to know whether or not the measures taken still provide effective safeguards – before the health and safety of any person is put at risk.

- Carry out a regular review of workplace procedures, involving all those who have accountabilities for health and safety (eg. area managers, supervisors).
- If work practices are modified, or new work practices introduced, review the preventive measures against the assessment factors to ensure they are still adequate. You should also review your assessment factors to ensure you haven't missed anything.
- If a heat or cold related incident (injury, illness or 'near miss') occurs, review the procedures that were in place at the time. If necessary, make changes to prevent a recurrence.



## **Appendix 1 – The most likely questions a WorkCover Inspector will ask about work in hot or cold environments**

- ▲ Do you have plant that exposes employees to heat or cold?
- ▲ How did you assess the risks that your operations might create in regard to heat or cold?
- ▲ What action have you taken – what risk controls have you put in place?
- ▲ What consultation with employees has occurred to develop safeguards for exposure to heat or cold?
- ▲ What training have you provided in the effects of exposure to heat or cold and the control measures in place?
- ▲ Do you have emergency procedures in place in the event of heat collapse?
- ▲ Have any employees suffered heat or cold-related illness in the past?
- ▲ Have you made any assessment of the physical capacity of an employee to perform work in heat or cold?
- ▲ Have you engaged a competent person to measure any of your possible exposures to heat or cold?

## Appendix 2 – Some frequently asked questions

### ▲ Are there any regulations that I must be aware of?

Yes. Occupational Health and Safety Regulation 2001 requires that employers take steps to protect employees from harmful effects of heat and cold.

These requirements are summarised in this code of practice wherever you see this symbol:



### ▲ Are there any Australian Standards that I should be aware of?

Yes. A number of Australian Standards address issues associated with working in heat and cold, as well as ventilation and other relevant subjects. Some of these include:

*AS 2865 – 1995 Safe working in a confined space*

*AS/NZS 2161.4:1999 Occupational protective gloves – Part 4: Protection against thermal risks (heat and fire)*

*AS/NZS 4740:2000 Natural Ventilators – Classification and Performance*

*AS/NZS 2161.5:1998 Occupational protective gloves – Part 5: Protection against cold*

The Standards you should be familiar with will depend upon your industry, your plant and your processes.

Standards Australia can be contacted on 1300 654 646; their website address is [www.standards.com.au](http://www.standards.com.au)

### ▲ How do I know whether the heat from our plant could cause heat stress?

You need to assess the risks, using the assessment factors explained in this booklet. If in doubt about how serious a problem could be, you should consider getting advice from someone competent to assess your heat sources and exposures. The manuals and information supplied with plant from the manufacturer or supplier may also provide some information to assist you.

### ▲ Do I have to arrange for Wet Bulb Globe Temperature (WBGT) testing?

This depends on your initial assessment of risk. If you believe you may have a problem with heat, but you are not sure of its extent, you should arrange for a competent person to measure exposure, using a heat stress index like WBGT. Persons with suitable training are occupational hygienists and can also include some engineers or ergonomists.

If you have put in place a work-rest regime to manage employee exposure to hot conditions, it's important that your employees are able to monitor temperature using the heat stress index chosen. This may require providing them with the equipment, and making sure they are able to monitor and measure conditions.

**▲ Is it necessary to provide warm clothing for employees working in cold conditions?**

You must provide warm clothing where it is used as personal protective equipment (i.e. to control risks). It is important that employees know what kind of clothing will provide the best protection for them. You must inform them, and supervise their work to ensure they are appropriately dressed in conditions where temperature, wind chill or rain may present a threat to health.

Warm clothing is clothing that is suitable for the purpose of:

1. working in artificially cold workplaces such as refrigerated areas; or
2. working outside in extreme climatic conditions such as those experienced in alpine zones or where there is a need to be protected against environmental conditions (eg. underwater work).

**▲ Can I rely on employees to recognise the signs of heat stress, and to report any problem related to work in hot conditions?**

If you have provided information alerting employees to the physical symptoms of heat and cold related illness, and developed procedures for reporting problems, you should be able to rely upon them to inform you before an incident occurs. This does not substitute for your responsibilities to supervise the work and monitor conditions.

And remember, you must eliminate or control the hazards to minimise the risk of employees being exposed in the first place. Remember to consider the factors outlined in Chapter 6 when controlling the risks.



## Appendix 3 – Work In Hot Environments Sample Risk Control Plan – Bakery

<p><b>Employee exposure to heat</b></p> <p><b>Source of heat</b></p> <ul style="list-style-type: none"> <li>Hot bread ovens.</li> </ul>	<p><b>Prevention Plan</b></p> <ul style="list-style-type: none"> <li>Air conditioning to be operative at all times while ovens are on, to maintain a comfortable surrounding temperature.</li> <li>Exhaust ventilation to be switched on above ovens during baking, to reduce heat build-up in their immediate vicinity.</li> <li>PPE to include gloves where hot items (equipment, trays) are to be handled.</li> </ul>
<p><b>Nature of work undertaken</b></p> <ul style="list-style-type: none"> <li>Baking: bread is placed into and taken out of ovens at frequent intervals.</li> <li>Ovens are opened briefly every 10-15 minutes to check progress of baking.</li> <li>Work involves sustained physical exertion while mixing dough, lifting flour bags, placing and removing trays</li> </ul>	<ul style="list-style-type: none"> <li>Staff who are not working with or near ovens to wear light clothing (shorts and T-shirt, sneakers) while baking is in progress.</li> <li>Work to be organised so that staff share tasks requiring close proximity to ovens.</li> <li>Staff to be encouraged to drink fluids while working. Cold drinks kept in refrigerator.</li> </ul>
<p><b>Duration of exposure to heat</b></p> <ul style="list-style-type: none"> <li>Electric ovens in operation from 2 am to 8 am in each shift.</li> <li>Exposure is intermittent throughout this six-hour period.</li> </ul>	<ul style="list-style-type: none"> <li>Work will be organised to allow rest breaks of five minutes each hour; twenty-minute break after three hours.</li> </ul>
<p><b>Physical condition and capability of the worker</b></p> <ul style="list-style-type: none"> <li>Two workers, 28 and 22 yrs of age, both fit and experienced in the tasks undertaken. No medical history or current medications which may affect capacity to work in hot conditions.</li> </ul>	<ul style="list-style-type: none"> <li>Any incidence of heat-related illness to be reported at once</li> <li>Any change in medical status (eg. employee taking prescribed medication) to be notified and medical advice regarding their fitness for work sought if any doubt exists.</li> </ul>

**Note:** This sample deals only with work in a hot working environment. In some industries, workers may be exposed to fluctuating conditions (eg. workers in cool stores who move repeatedly into and out of a refrigerated environment). Both working environments must be assessed. Because the final assessment factor (Physical Condition/Capability) refers to an individual worker, it will in most cases be necessary to complete a plan for each employee exposed to heat or cold.

## Appendix 4 – Work In Hot or Cold Environments Key Preventive Actions Checklist

### Identify the hazards

#### *Know:*

- Relevant environmental factors: air temperature, humidity, air movement, and radiant heat.
- The heat or cold effects of the plant being used.
- The heat or cold effects of work processes.

### Assessment factors: working out how serious the problem might be

#### *Look at:*

- Source of the heat or cold.
- Nature of work undertaken.
- Duration of exposure to heat or cold.
- Physical condition and capability of the worker.

### Risk controls: taking preventive action

- Has a risk control plan been developed to control risks by other ways than simply providing personal protective equipment?
- Do employees know the 'early warning' signs of heat or cold-related illness?
- Have first aid and emergency arrangements been made? Do people understand them?

### Checking that preventive measures are adequate

Have there been sufficient changes to the following that may effect health and safety?

- Environmental conditions (eg. weather)?
- Buildings, plant or equipment?
- The way the work is organised – the work routine or schedule?









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