Welcome to the safe@work Plumbing Module.

Have you read the General Module, completed the test and gained your safe@work General certificate?

The Plumbing Module should be done AFTER the General Module or Review Module.

If it is some time since you have completed the General Module you should read the Review Module. The test for the Plumbing Module contains some questions based on the Review Module.

There are common hazards in the plumbing industry. It is important to learn about these hazards and how they can be controlled so people at work are not exposed to risk.

The Plumbing Module contains information on:

- Powered Tools and Hand Tools
- Prevention of Falls
- Manual Handling
- Hazardous Substances
- Biological Hazards
- Electricity
- Burns
- Trenches and Confined Spaces
- Sunburn and Heat Stress

Within the plumbing industry, you may be involved in a range of work activities such as:

- installing hot water and gas services
- replacing guttering and downpipes
- laying and connecting water and sewage pipes
- fixing sink or sewage blockages.

Your employer must explain each task *before* you start work on it. You must be provided with instruction, training and supervision. You must know the first aid and emergency arrangements too, so if anything goes wrong you will know what to do.

Key Point
It is important that your employer has taken action to control risks. You must know and follow safe working procedures – not just for your own safety, but also for the safety of others working with you.

Powered Tools and Hand Tools

Note: Students in work experience programs must **NOT** operate powered tools. This information is designed to give students an understanding of the hazard and some of its risk control measures.

Powered tools and hand tools are used to carry out everyday tasks in the plumbing industry. For example, plumbers will often use tools such as electric drills, welding equipment, grinding tools, pipe cutters and hacksaws.

Powered tools present serious risks if not used and maintained correctly. The most common injuries are to hands and fingers, which could be cut, broken or crushed. Eye injuries are often caused by pieces of material flying off while being cut or ground by powered tools. Such injuries can lead to long periods away from work and sometimes result in permanent disability.

While some portable equipment (such as cement mixers) may be petrol driven, electricity is the usual power source. Electrical equipment exposed to outdoor working conditions should always be checked before use. Electrical leads can easily become split, frayed or pierced when used out of doors. If this happens, the tool must not be used until the lead has been replaced.

Key Point
Any faulty item of electrical equipment must be immediately withdrawn from use – it should be tagged (FAULTY – DO NOT USE) and removed from service until it has been repaired.

Hand tools can also be dangerous if they are not used correctly. A common cause of accidents with hand tools is using the *wrong tool* for the job. Your employer should make sure you are provided with the appropriate tools for each task, and should instruct you in how to use them safely.

When hazards cannot be eliminated or sufficiently reduced by engineering controls or safe working procedures alone, you may need to wear personal protective equipment (PPE) to improve protection.

PPE may include safety glasses or goggles, earplugs or earmuffs, protective gloves, overalls or other close fitting clothing. Safety shoes or boots with reinforced toe-caps will protect your feet if any heavy or sharp items are dropped.

Your employer must:

- have a maintenance program to make sure all tools are in safe working order
- train you to use tools and equipment before you use it, and make sure you are supervised
- provide any personal protective equipment needed and tell you how to wear and use it correctly.

What you should do

When you are using hand tools, you must follow safe work procedures as instructed by your employer or supervisor. These may include:

- wearing personal protective equipment provided by your employer
- operating the equipment correctly and safely according to your training
- concentrating on the job, as distractions can contribute to injuries

Prevention of Falls

Note: Students in work experience programs must **NOT** perform work at height. This information is designed to give students an understanding of the hazard and some of its risk control measures.

Falls are a major cause of workplace deaths each year. Victoria now has Regulations to cover all work where a fall of more than 2 metres could occur. These Regulations aim to reduce the number of fall-related incidents.

Many plumbing tasks are carried out at heights: these include work on roofs, installing or repairing gutters and downpipes, accessing roof cavities through manholes.

Employers must control the risks of falls in the most effective way practicable. The first questions an employer should ask is: ' *Does this work have to be done at height? Is there a way of doing the job from the ground?* '

Safe work methods must be established before a worker is required to access the task. The options for work at height (in their preferred order) are:

- use fall protection devices (such as temporary work platforms or scaffolding)
- use a work positioning system (such as a rope access system to position and support the worker for the duration of the task)
- use a fall injury prevention system (such as an industrial safety net or a safety harness)
- use a ladder, as long as it can be employed safely for the duration of the task – this will require procedures and training for the workers who will use it

Key Point
Ladders should always be visually inspected prior to use, to make sure no damage or wear has occurred that could make them unsafe.

An on-site risk assessment will be necessary every time work must be done at height. No two locations will be exactly the same, and safe systems of work must be established for each job before the work begins.

Manual Handling

Plumbers' work often involves significant manual handling hazards. Handling heavy and awkward objects, often in uncomfortable postures because of lack of space to move freely, creates a risk of traumatic injury such as back strain.

The need for continuous repetitive movements can lead to 'overuse' injuries, affecting neck, back, hand and arms over a period of time. Work should be arranged and monitored to minimise the risk of overuse injuries.

Key Point
You must talk to your employer or supervisor if you find a job is too heavy or too difficult, or if you feel it may put you at risk of injury.

It is your employer's responsibility to assess and control manual handling risks and to provide instruction, training and supervision for manual handling activities.

Risk controls may include:

- organising the work to reduce the number of manual handling tasks involved
- making sure you do not work long periods requiring strenuous manual handling activity
- making sure the work place layout allows you enough space to move and work safely and comfortably

Hazardous Substances and Dangerous Goods

Hazardous substances are chemicals used to carry out work, or present in the work environment. All of these may create hazards for plumbers if their use in the workplace is not managed with care:

- oxy-acetylene
- fluxes (solder)
- lead
- hydrochloric acid
- degreasers and solvents
- adhesives
- caulking compounds

Lead is a cumulative poison. It is toxic to virtually every human organ and can have serious long term health effects.

Lead sheet, flashing, PVC products, lead solder and a number of plumbing fittings all contain lead.

Lead can enter the body as dust or fumes, and plumbers who have been working with lead must wash their hands carefully before eating. Food should not be consumed in workplaces where lead dust is present.

A safe system of work is essential to limit possible exposures to lead: This will include:

- identifying lead hazards and assessing the risks of exposure
- using alternatives to lead, such as acrylic coated flashing, lead-free PVC, tin or silver solder
- making sure that the need to wash hands thoroughly before eating is understood
- changing your clothes at the work site when the job is done – to prevent lead dust being taken home on clothes, bodies and in cars
- providing appropriate personal protective equipment (PPE) – respirators and face masks, overalls and gloves will all increase protection

Your employer must keep an up to-date material safety data sheet (MSDS) for each substance used in your work. As plumbing work takes place in many different locations, you will need to carry the MSDS with you to the work site. It will include first aid instructions in case of a splash which results in eye injury or accidental swallowing of a chemical.

Key Point
Your employer must make sure you follow safe work procedures and use hazardous substances according to the manufacturer's written instructions provided on the material safety data sheet (MSDS).

Dangerous goods have the potential to present an immediate threat to people, property or the environment if not properly contained and controlled. **Natural gas** is flammable and is classed as a dangerous good. Plumbers working with gas supply must take care to follow safe systems of work.

Biological Hazards

Health effects of exposure to sewage include *tetanus* (caused by a toxin produced by bacteria common in soil and sewage), *leptospirosis* (caused by a parasitic worm), *hepatitis A* , and parasites such as *giardia* and *cryptosporum* .

The degree of the harm that can result depends on the microbes present, and the extent and duration of exposure. Microbes in raw sewage can enter the body through the nose or mouth, particularly if a person drinks contaminated water or by hand-to-mouth transmission. Exposure can also occur through open wounds or by inhaling (in dust, for example).

Plumbers can be exposed to raw sewage when working on sewage pipes or septic tank outlets. Measures should be in place to prevent direct contact with raw sewage. Employers must make sure that:

- the possible risks of exposure are evaluated before the job begins
- required hygiene practices are known and followed
- appropriate PPE is provided and worn
- first aid and emergency procedures are documented and understood by workers

Key Point
Workers must be informed of the health hazards of contact with sewage, and the safety measures which must be implemented to avoid exposure to risk.

The important safety measures when handling sewage contaminated materials are:

- assume anything touched by sewage is contaminated
- do *not* eat or drink in any sewage handling area
- wash hands well with soap and clean (preferably hot) water before eating or drinking, and after touching any surface or object that may be contaminated by sewage
- immediately wash and disinfect any wound that comes into contact with sewage
- change out of work clothes before leaving the work site (soiled work clothes should be bagged and laundered separately from other clothing)
- wear appropriate PPE: this will include rubber boots and gloves, overalls and eye protection (wear goggles if a hose will be used, as safety glasses will not protect against splashing)

Employers should make sure that workers have been vaccinated against tetanus and diphtheria. Vaccination for hepatitis A is also available and should be considered.

Most of the precautions outlined above will also apply to work with soil. If while laying pipe, for example, the hand or fingers are cut by glass or metal objects in the ground, the wound must be immediately washed and disinfected.

Sharps , which include syringes, are also a potential source of contamination. In public buildings, sewer pipe blockages could be due to discarded syringes. Guttering is also a common location for sharps, and plumbers must be constantly aware of the potential for needle stick injuries when working in 'vulnerable' locations.

Workers unable to see the cause of a blockage in pipes, gutters or downpipes should not feel around for objects with an unprotected hand, as a needle stick injury could easily occur.

Employers must have first aid and emergency procedures in place to deal with any possible contamination, and workers must know what to do if an incident occurs.

Electricity

Note: Students in work experience programs must **NOT** work where they could be exposed to electrical hazards. This information is designed to give students an understanding of the hazard and some of its risk control measures.

Electric leads must be kept away from water. Because plumbers use powered tools in proximity to water supply, and out of doors in all weather conditions, there is always the possibility of electrocution if work practices do not take into account the presence of electrical hazards.

Leads should be inspected prior to each job, should never be allowed to come into contact with water, and electricity-powered tools should be regularly tested and tagged.

Plumbers are not qualified to undertake electrical work, but their work can bring them into contact with 240 volt wiring. Drilling into walls when connecting water services is hazardous and the location of electrical wiring must be established first.

Insulated hot water pipes with **240-volt heat trace cables** are used to maintain water temperature in many modern apartments. If power to the heat trace cable is not isolated, there is potential for electrocution when a plumber unknowingly cuts through the insulated pipe. Simply turning off the water supply valve will NOT shut down the power to the cable.

The steps to avoid electrocution occurring in this way are:

- establish whether the system is using heating cables to maintain water temperature
- switch off, lock and tag the 240 volt supply to the cable
- remove insulation carefully and inspect the pipe to locate any heat trace cables. This can be done with a sharp blade that will remove insulation but will not penetrate the protective outer casing of the cable

Employers must instruct workers to treat *all* hot water lines as having heat trace cables attached.

Key Point
Employers must instruct their workers to assume that ALL hot water lines have heat trace cables attached until they have inspected the pipes and established that it is safe to go ahead.

Work at roof line or on roofs also has potential for contact with overhead power lines. Employers should require that plumbers in their employ "take five" to size up the potential risks before starting work on any job. Only when *all* hazards have been identified can the risks be assessed and controlled.

Burns

Hot water services store water at high temperatures. Maintenance and repair work must be carried out carefully to avoid scalds and steam burns. The unexpected release of hot water or steam could result in serious injury and permanent disfigurement.

Where possible, hot water systems should be switched off and allowed to cool before work begins. If this cannot be done, work systems must be in place to ensure that the job can be done safely.

In case any incident does occur, first aid and emergency procedures must be clear. No worker should be left to work alone where there is any possibility of a disabling incident such a steam burn.

Key Point
First aid training is essential in every industry. Plumbers should be able to provide basic first aid to a fellow worker if necessary.

Trenches and Confined Spaces

Plumbers working in trenches, pits, tanks, beneath houses and in roof cavities must understand and plan for the significant hazards of confined spaces.

In sewage systems, the release of toxic gases can cause collapse, unconsciousness and death. Lack of oxygen is also potentially fatal. Before any worker begins a job in a confined space (such as a pit or tunnel) where gases could be present or oxygen may be deficient, there must be a full assessment of the worksite and the safeguards required.

Any potentially unsafe atmosphere must be identified, and work practices must ensure there is no possibility of a worker being overcome. This may mean breathing apparatus must be worn, and may also require that a lifeline is attached to the worker.

Key Point
Confined space hazards can kill: only fully trained and equipped workers should undertake work where the atmosphere could present a risk to safety.

No person should work in a confined space without a second worker (outside the space) to monitor their safety. In the event of a person collapsing in a confined space, the second worker must **not** enter the space for rescue unless they have been specifically equipped and trained to do so.

Trench collapse can also lead to fatalities. Trenches must be constructed and reinforced so that there is no possibility of their trapping workers who are installing or repairing pipes and other fixtures. In residential plumbing work, trenches will usually be shallow, but risks must still be assessed before the job begins.

Sunburn and Heat Stress

Heat stress, sunburn and skin cancer can all result from prolonged exposure to ultraviolet radiation from the sun. The longer the skin is exposed, the greater the risk – regardless of tan or skin pigment.

Short-term risks of working in the sun include blistering and peeling of previously sun affected areas, acute skin reactions with certain drugs and skin creams, and sore, swollen eyes. **Long - term** risks include skin cancers, premature ageing, wasting skin tissues, clusters of tiny blood vessels and cataracts in the eye.

Your employer should assess the day's work and the expected weather conditions. Preparation for the job should include consideration of things like:

- available shade
- frequency of rest breaks
- need for regular rehydration (by drinking water, *not* soft drinks)
- awareness of each worker's heat tolerance (age, physical fitness and experience of the work can all affect a person's ability to adapt to hot or excessively humid conditions).

Heat stress can also occur as a result of working in periods of high humidity. Where possible, your employer should re-schedule strenuous work for cooler periods in the day. If this cannot be done, it may be possible to rotate jobs, to limit the time each worker spends working in potentially harmful conditions.

Protective clothing and sunscreen should always be worn when working in the sun. Head covering is important, as are loose, long sleeved shirts and long trousers in hot weather. Sunscreen should be rated SPF 15+ or more (this means it will give at least 15 times the protection that skin would give without any covering). Sunscreen should be reapplied every two hours.

Because plumbing involves work in different locations, exposure to extreme conditions could occur even when you are not directly exposed to the sun.

For example:

- Work in enclosed spaces – beneath houses, in roof cavities
- Work in trenches or pits

Key Point
Your employer must establish safe systems for work outdoors and work in hot environments. You should also know what to do if you think anyone is showing signs of heat stress or sunstroke.

Self-Assessment Questions

Now try the self-assessment questions.

There are 16 questions. If you get 12 or more correct you will be awarded a safe@work Certificate.