

# Worker Safety in the Plumbing Industry

## Introduction

The NSW plumbing industry is changing rapidly and unfortunately the dangers inherent to plumbing are not changing. As the "Skills Shortage" deepens in plumbing, more new entrants are entering the plumbing trade. These new entrants are coming in new forms such as School-based apprentices, VET and prevocational students and plumbing labourers.



The safety of these new entrants is of prime concern to the NSW plumbing industry and the Master Plumbers Association of NSW (MPANSW) have developed a specialist OHS induction training course particularly for plumbing apprentices. For more information contact the Association on 02 8789 7000.

In addition, Master Plumbers Apprentices Limited (MPAL) and MPANSW are determined to create an awareness program that would help educate apprentices on the dangers of working within plumbing and increase the level of safety of all workers within the plumbing industry.

It was agreed that the MPAL would apply for WorkCover Assist funding to create this program

- by better educating these "New Entrants" beyond the level of the General OH&S Induction training for the Plumbing Industry (Plumbing Induction card formerly Greencard) before they start work or training will increase understanding of Occupational Health Safety policies and procedures and decrease the number of incidents in the plumbing trade.
- Workers within the plumbing industry need additional training in practical terms. What to do in specific circumstances, what are the danger inherent to particular plumbing practices and how to access further information if required.

MPAL decided that the best way forward was to create a series of resources for the industry and determined the best format would be a series of two videos and a handbook.

- **Safety Training Video for plumbing workers starting in plumbing**
- **Safety Training Video for plumbing workers starting in plumbing**
- **Worker Safety in the plumbing industry handbook**

This is the handbook and the videos are available by visiting [www.mpal.com.au](http://www.mpal.com.au) or [www.masterplumbers.com.au](http://www.masterplumbers.com.au).

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## Special points of interest:

- Plumbing Tools
  - Hand
  - Power
  - Abrasive
  - Pneumatic
  - Hydraulic
- Safe Digging
- Safe Lifting
- Safe Carrying
- Safe Pushing
- Safe Moving
- Gas Cylinders
- Working at Heights

Editor

Steve Cunningham

## The NSW System

WorkCover NSW administers and enforces compliance with occupational health and safety (OHS), injury management and workers compensation legislation, and manages the workers compensation system. WorkCover promotes safer and healthier workplaces for workers.

It enforces the occupational health and safety legislation through education, inspections, investigations into incidents and complaints and, when necessary, applies penalties and prosecutions.

WorkCover also has a regulatory role in licensing and certification of certain activities and hazardous equipment.

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### Acts of the NSW Parliament

The NSW Parliament, in combination with the courts, determines the legal frame work in NSW and the Parliament creates acts of Parliament that become law. An Act is legislation made by Parliament and is therefore a law.

WorkCover's main statutory functions are to administer the Acts listed below:

- Occupational Health and Safety Act 2000
- Workers Compensation Act 1987
- Workplace Injury Management and Workers Compensation Act 1998
- Workers Compensation (Bush Fire, Emergency and Rescue Service) Act 1987
- Workers compensation (Dust Diseases) Act 1942
- Sporting Injuries act 1978
- Explosives Act 2003
- Rural Accommodation act 1969

These Acts are written by lawyers and are full of legal terms, so can be quite difficult to understand. Often, Acts have regulation-making powers allowing regulations to be made under them. Regulations are often easier to understand and follow.

### Regulations

A regulation is still a law and, as such, employers, workers, insurers, designers, manufacturers, suppliers and others must meet their obligations under both the legislation and the regulations. Regulations support the general requirements of the legislation and provide more detail. WorkCover administers the following regulations:

- Workers Compensation Regulation 2003
- Workplace Injury Management and Workers Compensation Regulation 2002
- Workers Compensation (General) Regulation 1995
- Workers Compensation (Insurance Premiums) Regulation 1995
- Workers Compensation Transitional Regulation 1997

- Workers Compensation (Bush Fire, Emergency and Rescue Services) Regulation 2002
- Occupational Health and Safety Regulation 2001
- Occupational Health and Safety (Clothing Factory Registration) Regulation 2001
- Dangerous Goods (General) Regulation 1999
- Dangerous Goods (Gas Installations) Regulation 1998
- Explosives Regulation 2005

### Codes of Practices

Industry codes of practice provide practical guidance and advice on how to achieve the standard required by the Act and regulation. Codes of practice are developed through consultation with representatives from industry, workers and employers, special interest groups and government agencies.

Codes of practice are made under the *Occupational Health and Safety Act 2000* and must be approved by the Minister for Commerce before they come into effect.

A code of practice is not law, but it should be followed unless there is an alternative course of action that achieves the same or better standards.

Employers, workers, designers, manufacturers and suppliers should use the code of practice in conjunction with the Act and regulation.

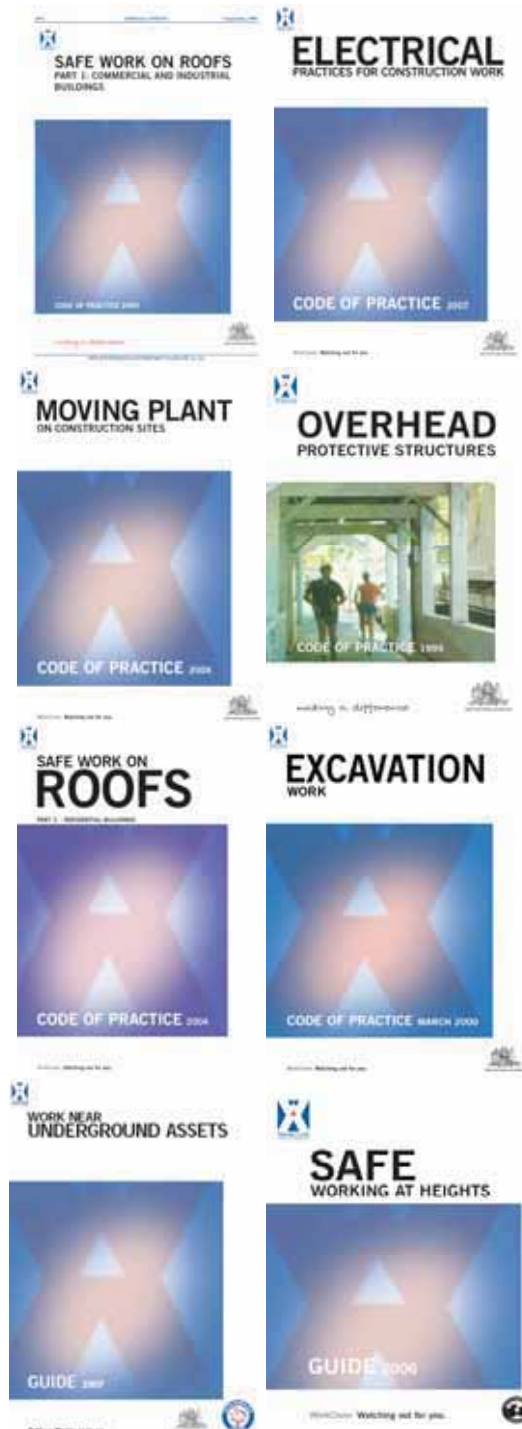
Evidence of failure to observe an industry code of practice may be used as evidence in proceedings for an offence under the Act. However, a person is not liable simply because of a failure to observe the code.

To correct an alleged breach of the Act or Regulation, a person or organisation must follow the advice and information provided in the code of practice if directed by a Workcover inspector.

### Guides

WorkCover produces guides to assist industry and workers comply with the requirements of the Acts and Regulations. WorkCover, in conjunction with the plumbing industry, have produced a large amount of guides specifically for use by workers within the plumbing industry. These guides are an invaluable resource to both workers and employers within the plumbing industry.

A full list of publication is available by visiting the WorkCover Website and entering the publications portal.



All these publications are available by visiting [www.masterplumbers.com.au](http://www.masterplumbers.com.au) or [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)



## Worker and Employer - Duty of Care

The Occupational Health and Safety Act 2000 is based on the principle of Duty of Care and covers all plumbing workplaces in NSW.

Implementing the duty of care principle means planning for the prevention of workplace incidents, injuries and illnesses.



- There is a general duty of care on employers of the workplace to ensure the health, safety and welfare at work of all employees and others who come on to the workplace.
- It is the employer's responsibility to ensure that all reasonably practicable measures have been taken to control risks against all possible injuries arising from the workplace.
- The employer's duty of care applies to all people in the workplace, including visitors, contractors etc.
- There is a general obligation on designers, manufacturers and suppliers of plant and substances for use by people at work to ensure that their products are not a risk to health and safety when properly used, and to provide information on the correct use and potential hazards associated with the use of the products in the workplace.
- There is a general obligation on employees to take care of others and co-operate with employers in matters of health and safety. An employee must also co-operate with the employer or other person so far as is necessary to enable compliance with the OHS Act 2000 and OHS Regulation 2001 (section 20, OHS Act 2000).
- As employers are in control of the workplace and workplaces can have significant risks to health and safety, employers are required to organise their workplace and their work systems to ensure people at work are not put in harm's way.

### Worker Rights & Responsibilities

A **worker** can be full-time, part-time or casual. A worker may be a person:

- apprenticeship or otherwise with an employer and under that contract does manual labour, clerical work, or otherwise
- person who is deemed to be working under a contract of service
- person who is deemed to be a worker
- pupil attending a school who is employed under a work experience arrangement
- student of a TAFE provider who is employed under an agreement
- person who is directly employed by one employer but contracted to work with another (such as Group Training)

### Worker Duty Of Care

All workers have a duty of care to ensure that they work in a manner that is not harmful to their own health and safety and the health and safety of others.

## Risk Management

An employer has an obligation to identify and assess foreseeable hazards. If it is not reasonably practicable to eliminate the risk, the employer must take steps to control the risk.

Risk management is covered in detail in Chapter 2 of the OHS Regulation 2001. Other chapters also refer to obligations of risk management as they apply to specific hazards, activities or places of work.



Risk management involves assessing the harm of those hazards. It is the process of:

- identifying any foreseeable hazard - anything in the workplace that has potential to harm anyone at the workplace, eg moving parts in machinery, toxic chemicals, manual handling tasks;
- assessing the risk from the hazard - finding out how significant the risk is eg will it cause a serious injury, illness or death and how likely is this to occur?
- eliminating the hazard or if this is not possible, controlling the risk from the hazard - implementing strategies to eliminate or control the hazard eg. design equipment differently, add machine guards, use safer chemicals, providing lifting devices to minimise manual handling or use personal protective equipment.

*Note: This phase is more commonly referred to simply as risk control but the possible elimination of the hazard(s) must be considered before risk control is undertaken.*

- Reviewing risk assessment - to monitor and improve control measures and find safer ways of doing things. (Clause 9 of the OHS Regulation).

**Plumbing Industry**



# Safe Work Method Statements

18 Hazard Profiles, 82 Safe Work Instructions, a unique SWMS template and a training course to assist you to develop, review and maintain your Safe Work Method Statements.

**Master Plumbers Association of NSW**  
**Tel: 02 8789 7000**    **[www.masterplumbers.com.au](http://www.masterplumbers.com.au)**

|                            |                     |                                            |
|----------------------------|---------------------|--------------------------------------------|
| Including                  | • Fitout & Finish   | • Install and Replace Hot Water Service    |
| • Backflow Prevention      | • Fire Services     | • Install and Replace Roof Plumbing        |
| • Drain Cleaning           | • Gas Services      | • Install and Maintain Water Supply        |
| • Drainage Systems - Sewer | • Sanitary Plumbing | • Install and Maintain Mechanical Services |
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**Much More**

## Hierarchy of hazard controls

Hazards must be controlled using a range of methods. This page lists various strategies, in order of preference, which should be considered in hazard control.

The hierarchy of hazard controls is a list which emphasises controlling a hazard at the source. This is done by giving preference to the use of the 'engineering controls' outlined in strategies 1 to 5. These types of strategies should be used, where possible, because they are less subject to human failure and because they are less disruptive and uncomfortable for people working in the area. Whichever methods you use, remember that in each case their effectiveness should be monitored regularly.



**DESIGN.** Try to ensure that hazards are 'designed out' when new materials, equipment and work systems are being planned for the workplace.

**REMOVE** the hazard or **SUBSTITUTE** less hazardous materials, equipment or substances.

**ADOPT A SAFER PROCESS.** Alterations to tools, equipment or work systems can often make them much safer.

**ENCLOSE OR ISOLATE THE HAZARD** through the use of guards or remote handling techniques.

**PROVIDE EFFECTIVE VENTILATION** through local or general exhaust ventilation systems.

**ESTABLISH** appropriate **ADMINISTRATIVE PROCEDURES** such as:

*job rotation to reduce exposure or boredom, or timing the job so that fewer workers are exposed  
routine maintenance and housekeeping procedures training on hazards and correct work procedures.*

Personal Protective Equipment **PROVIDE** suitable and properly maintained **PERSONAL PROTECTIVE EQUIPMENT** (PPE) and training in its use.

*For more on Personal Protective Equipment, download the high visibility clothing guide.*





**CONSTRUCTION INDUCTION CARD**

Have all members of staff completed this training?  
Do you have a copy of each card on file?

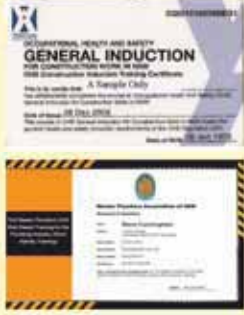
**WORK ACTIVITY INDUCTION**

Have all members of staff completed this training?  
Do you have a copy of each Certificate on file?

**Did you answer NO?**

Then stop and make arrangements to get a copy for each employee and place it on their file.

Training details available at  
[www.masterplumbers.com.au](http://www.masterplumbers.com.au)




## Common Plumbing Industry Hazards

Whether you have been working in the plumbing industry for years or this is your first job, (be it full-time, part-time, casual or an apprenticeship) plumbing can be an exciting and demanding experience. During this time responsibilities and expectations are placed on you in the working environment. Employers provide students with valuable opportunities to gain experience in the workplace. It is important to understand that employers have responsibilities towards you, and that you also have responsibilities towards them.

Health and safety work is everyone's responsibility. It is important that you have a general understanding of health and safety for the industry in which you will be undertaking your work experience or work placement.

While you are at a workplace on a work placement or work experience, the employer is responsible for ensuring the workplace is safe, including:

- providing safe work areas, machinery and equipment;
- providing information, instruction, training and supervision; and providing personal protective equipment.

*The employer must ensure that your health or safety is not harmed in any way. You must take responsibility for looking after your own health and safety, and not put others at risk.*

This includes:

- following safety instructions;
- using equipment carefully; and
- reporting hazards and injuries.

*Young workers are usually keen to work hard and do well. They also have a much higher risk of having an incident occur.*

There are common hazards that exist in the plumbing industry. It is important to learn about these hazards and how to work safely in these environments. Within this industry you may be involved in a range of work activities such as:

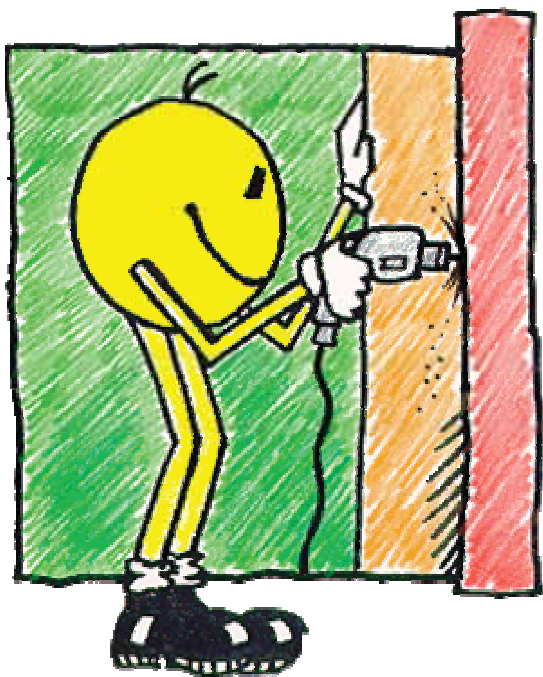
- water plumbing in a residential home,
- operating equipment including hand tools and portable power tools,
- taking measurements, completing aspects and design and interacting with consumers
- performing site calculations and installing roof components,
- completing gas plumbing within a hospital
- completing roof plumbing in a school
- completing drainage plumbing on a commercial site
- completing mechanical service plumbing in a shopping centre
- completing sanitary plumbing on a residential high-rise building
- and a thousand other permutations

The hazards involved in each are unique but we know that there are certain hazards that will appear time and time again. This section of your handbook addresses some of those hazards.

## Hazard Identification

Before we go on to look at the individual hazards and how we can address them, it is timely to remind ourselves hazard identification is a key step in preventing injury and disease in the workplace. Where there's a risk, you need to stop and think. You need to think about what you are about to do, the potential risks and the likely effects on yourself and other people.

**The 3 Step Approach to Hazard Identification:**



**1.**

**Spot the hazard.**

**Be alert at work! Notice potential hazards and work out what the problem is.**

**2.**

**Assess the risk.**

**Talk to your supervisor about the hazard and work out a way to solve the problem.**

**3.**

**Make the changes.**

**Follow through. Carry out the agreed actions in order to solve the problem.**

## Typical hazards found in plumbing

### Falls

Steep roofs, ladders, scaffolds, balconies, overhead storage and work heights 2 metres or more are common at plumbing sites. Roofing poses the highest possibility for falls, and therefore, guardrails and safety lines need to be utilized. (An additional exposure to consider in roofing is the possible presence of asbestos materials.)

### Digging

There is a high probability for coming in contact with unseen services when completing excavation work. Dial Before You Dig provides a map of services that you may encounter when completing excavation work and should be contacted before work begins. Work should not proceed until your employer has received a copy of a map detailing any services near where you intend to excavate. Fatalities and serious injuries can occur when excavation is not completed according to the excavation code of practice.



### Back Strains

Roofing, excavation work and other tasks include heavy lifting and require workers to work in awkward positions, which can contribute to strains. In addition, plumbing activity often results in costly incidents from slips, trips, falls that also can cause strains.

### Guards

Guards are sometimes purposely removed from equipment with the idea of increasing productivity; however, severe cuts, amputation and costly delays are a possibility. Guarding blades, moving belts and other moving parts are a requirement of the OH&S regulation and therefore, law.

### Respiratory Problems

Bricks and wood are cut with fast moving blades that cause airborne particles. Fumes, vapors, grinding operations, spray paint, hazardous materials, hot liquids, metals and chemicals may also abound on the plumbing site. These exposures to loss contribute to the possibility of both bodily injuries and long-term respiratory disease. Personal protective equipment, such as goggles, face shields, respirators, shoes and gloves must always be used.

### Cave-ins

There is a high probability for cave-ins when working below ground level. Fatalities and serious injuries can occur when excavation is not completed according to the excavation code of practice.

### Human Element

While job-site factors are important, the vast majority of plumbing incidents occur due to workers' unsafe acts and omissions. Some examples include servicing equipment while it is in operation, horseplay, unauthorized use of the equipment, walking under a suspended load, passengers riding on fenders and storage of dynamite and caps in the same location.

Plumbing workers should arrive at work feeling physically fit and rested. Fatigue and stress in meeting deadlines can lead workers to make unpredictable mistakes. An examination of historical records reflects a pattern of fewer incidents among older and experienced workers who have developed the patience needed in plumbing activities. New workers lack knowledge of defined procedures and have not had the opportunity to develop safety habits. Very close supervision is required.

Supervisors are responsible for initial safety instructions and are held accountable. There is the need to control hazards and train individual workers.

### Hazard Elimination

Eliminating hazards prevents incidents from occurring and is an excellent first step of risk control. Look for clutter in traffic or work areas, on stairs in traffic lanes and fire exits. Check for loose materials, lumber shavings, scraps, oil, grease and liquid spills. These hazards fall under the category of "housekeeping," a major barometer of risk control success. Other hazards include unguarded floor openings, defective ladders and missing rails on scaffolding.

### Hazard Control

After doing everything possible to eliminate hazards, policies and procedures should be adopted to cope with remaining hazards that are impossible to eliminate. The goal here is to minimize losses. This includes wearing proper eye and ear protection. Select only UL labelled equipment that has factory designed guarding. Wear suitable clothing, hard hats, safety shoes, gloves and aprons when needed. Use respirators where necessary. Supervisory personnel need to set a proper example when performing their work tasks.



"Up until this morning I considered you my best welder. That was before you joined the ranks of the unemployed."



### Training

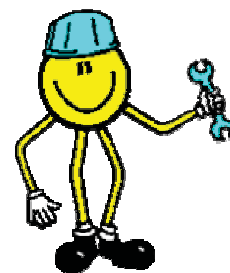
Effective on-the-job training and daily safety discussions before each activity can minimize incidents. Periodic risk control meetings should give plumbing project leaders the opportunity to demonstrate their commitment to loss control. This will maintain enthusiasm to minimize incidents.

### Emergency Procedures

Emergency telephone numbers for ambulance, fire and police should be readily available. Adequate first aid trained personnel and equipment are important for each location. Written emergency procedures should also be posted.

The goal is to get the job done efficiently without incidents. Incidents cause expensive delays. Compliance with common sense rules will complete the goals and minimize overall costs.

## Hazards in different types of plumbing sites



The type of works involved at sites has a relation to the type of hazards expose to the workers. Further analysis shown below are the type of hazards associated with the type of works involved. A recent study into various work site produced the following results:



### Hazards at Plumbing Sites Involved In Infrastructure Works

The analysis of the data collected through site visit had indicated the following hazards at infrastructure works sites to be the most common : -

1. Excavation was ranked 2 with a high frequency of 15 out of 15 sites.
2. Ladder was ranked 2 with frequency of 15 out of 15 sites.
3. Plant and machinery was ranked 3 with frequency 15 out of 15 sites.

### Hazards at Plumbing Sites Involved In Housing Development

From the analysis carried out, hazards at sites involves with housing development are identified to be as follow: -

1. Roof work was ranked 2 with frequency 40 out of 45 sites.
2. Ladder was ranked 3 with frequency of 45 out of 45 sites.
3. Manual handling was ranked 3 as well with frequency 40 out of 45 sites.



### Hazards at Plumbing Sites Involved In High Rise Buildings

From the analysis carried out, hazards at sites involved with high rise building plumbing are identified to be as follows: -

1. Scaffold was ranked 2 with a frequency 45 out of 45 sites
2. Ladder was ranked 3 with frequency of 45 out of 45 sites.
3. Power access equipment was ranked 3 as well with frequency of 35 out of 45 sites.

### Hazards at Plumbing Sites Involved In Industry Buildings

From the analysis carried out, hazards at sites involved with industry building are identified to be as follows: -

1. Roof work was ranked 2 with frequency 13 out of 15 sites.
2. Scaffold was ranked 3 with frequency 15 out of 15 sites.
3. Plant and machinery and manual handling were ranked 3 with frequency of 14 out of 15 sites.



### Hazards at Plumbing Sites Involved In Institutional Building

From the analysis carried out, hazards at sites involved with institutional building development are identified to be as follows: -

1. Roof work was ranked 2 with frequency 15 out of 20 sites.
2. Ladder was ranked 3 with frequency of 20 out of 20 sites.
3. Scaffold was ranked 3 as well with frequency 18 out of 20 sites.

## Hazards requiring special attention

### Scaffold

Scaffold is identified as one of the main hazards in plumbing sites. Checklists of hazards regarding scaffold works at sites include items such as competent person, access, condition of elements, ties and working platform, guard rail, toe boards, signage and inspection. Working on a scaffold is full of dangers and by looking at past incidents on scaffolds we can inform you of the following dangers:

- Fall from
- Fall against
- Being struck from above
- Insufficient signage
- Faulty scaffolding
- Parts removed
- Collapse



**Further information**—*Industry Safety Standard for Erecting, Altering and Dismantling Scaffolding - Part 1: Prefabricated Steel Modular Scaffolding*

### Ladder

Hazards associated with ladders include items such as:

- Ladder condition
- Ladder position
- Ladder foundation
- Suitability
- Prevention of slipping sideways
- Fall from



**Further information**—see portable ladders available [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)

### Roof Works

When dealing with roof works, precaution to exclude people from areas below roof works and other additional precautions to stop debris falling onto them are common hazards. It is followed by barriers and guard rails or covers to provide people pass or work near fragile material. Hazards in association with ladders include items such as:

- Fall from
- Fall through
- Fall against
- Objects falling



**Further information**—see codes of practice for working on roofs Part 1 & Part 2 available [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)

## Manual Handling

Hazards in association with manual handling are the most prevalent of all the injuries that involve plumbers. Injuries associated with manual handling include:

- Back injuries
- Hand injuries
- Neck injuries

**Further information**—see national standard for manual handling available [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au) or later chapter in this publication

## Plant And Machinery

Most hazards identified in association with plant and machinery were identified to be more significant at sites involved in infrastructure works, high-rise buildings and industry building.

**Further information**—see moving plant on construction sites available [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au) or later chapter in this publication



## Excavation

Excavation was identified to be the major hazard in plumbing sites. The following hazards are commonly associated with excavation work and should be considered:

- The fall or dislodgement of earth and rock
- The instability of the excavation and adjoining structure
- The inrush or seepage of water
- Unplanned contact with utilities
- The placement of excavated material
- Falls into excavation
- The movement and position of plant and machinery
- Ground vibration
- Noise
- Vehicle movement
- Manual handling injuries
- Changes to excavation conditions



**Further information**—see Code of Practices for Excavation sites available [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)



## Hazardous Substances

Hazardous substances must be stored correctly and a Material Safety Data Sheet must be kept with the Hazardous Substances.

**Further information**—see Code of Practices for Control of Workplace Hazardous Substances available [www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)

## Preventing injuries and ill health in plumbing

You might think that the active, outdoor life in the plumbing industry would keep you fit and healthy. Quite the reverse is true and the construction industry has a deservedly notorious reputation as being dirty, difficult and dangerous.

More than 100, 000 people suffer fatal injuries on building sites every year. That means that one person is killed in a site incident every five minutes. Many hundreds of thousands more people suffer serious injuries and ill health because of bad, and often illegal, working conditions.

### Deaths on Site - Predictable but not Prevented

The real tragedy behind the statistics is that deaths are preventable. Most people are killed whilst carrying out perfectly routine work, where the hazards are well known. Some of the principal causes of fatal injuries in construction are described below. Although this is not an exhaustive list, these are all priority hazards for prevention. Deaths from these causes can and should be avoided by the use of collective prevention measures.

Any of the circumstances described below can be a recipe for disaster. However, the lack of collective prevention measures is particularly dangerous when combined with work **organisation factors**. That is the management failures which characterise the industry: spectacularly poor housekeeping; chaotic working conditions; lack of planning and coordination; lack of training and supervision, and the intense productivity and time pressure.

### Falls:

The number one construction killer in any country is falling from heights.

#### Scaffolding fall causes include

- Inadequate, improvised scaffolding with no proper access or no guard rails to prevent falls. In some instances scaffolding may be erected by unqualified operatives, and thereafter the lives of everyone who works from the scaffold are endangered. Scaffolding may be improvised using inappropriate materials. Common, fundamental scaffolding problems are:
  - the base is not stable,
  - materials used to construct the scaffold are defective or unsuitable
  - it has no guard rails or has guarding that creates a false sense of security
  - has no proper access, so workers are obliged to perform acrobatics
  - has only single, or insufficient, boards and is full of traps, resulting in more balancing acts for the workers
  - it is not properly tied in to the building.



The overloading of scaffolding for storage of materials is often the straw that breaks the camel's back and leads to the collapse of the scaffold. All of these factors can and do kill. It seems almost ridiculous to mention the absence of toe boards, netting, fall arrest systems and other more sophisticated equipment.

**All check the safety of scaffolding before entering on working within a scaffold.**

#### Other causes of falls

- *Unprotected openings, stairwells and shafts inside buildings (for lifts, heating, air conditioning, ventilation)*
- *No edge protection in roof work to prevent falls, or falling through fragile roofs (particularly asbestos cement roofs) due to lack of crawling boards*
- *Demolition work*
- *Inappropriate use of ladders*
- *Inappropriate use of hoists*

## Fatal crush injuries and being struck by falling objects

- Excavations which are not shored up (or at least sloped) may be unstable and collapse, particularly after rainfall, crushing, burying and asphyxiating the workers trapped below the heavy soil.
- Vehicles operating too close to the edge, where there are no stop blocks, may also cause a cave in.
- Walls collapse when excavations undermine them.
- Buildings collapse when supporting structures are injudiciously altered.
- Falling objects, materials or tools can strike and kill workers. Hard hats can save lives or reduce injuries in many circumstances. The causes are lack of toe boards on scaffolding, lack of tool belts for workers, bad storage and stacking, and poor housekeeping.
- Improper use of hoists and cranes.
- Being struck or crushed by vehicles, due to poor organisation and signalling.
- Overturned dumper trucks, due to overloading, or where gradients are too steep, or approaching too close to excavations.
- Machinery crushing or trapping workers, resulting in fatal injuries.



## Electrocutions

- Cable strikes
- Contact with or arcing from overhead cables

## Building ill health, invisible and ignored

Workers in plumbing are exposed to a wide range of hazardous substances and physical hazards. In many countries, the resulting health problems are not recognised as being work related, and are not reported, recorded or compensated. This social invisibility, this censorship of the true damage to workers' health, means that there is no national policy to prevent occupational ill health in the sector. It is a vicious circle.

Yet, as with incidents, the causes of ill health are well known and can be prevented or controlled. Improvements can be made by substitution of hazardous materials for safer ones; by the introduction of safe working methods; by the use of good PPE; through information, training and workers' participation.

## Deafness

Exposure to hazardous noise levels is so widespread as to be routine, and occupational deafness is very common among building workers. Here, noise reduction methods can be used, for example on compressors, but Personal Protective Equipment and training are essential to prevent hearing loss.



**Vibration syndromes** hand arm vibration can cause damage to blood vessels and nerves that leads to lack of sensitivity in the fingers called Raynauds Syndrome. This condition is particularly due to the use of pneumatic tools. Whole body vibration caused by operating heavy machinery and vehicles, and can cause damage to the spine.

**Back injuries** caused by manual handling of heavy loads, sometimes over long distances. For example bricks, cement blocks and cement bags weighing 50 kilos. Confined spaces, awkward postures, heavy task and productivity demands, and long hours. Lower back injuries, sciatica, hernias and slipped discs can put people out of the labour market for good.

**Other musculo skeletal disorders,** injuries to muscles, nerves, tendons and joints caused by physically demanding work. Risk factors include: uncomfortable postures, forceful and repetitive movements, awkward tools and sustained effort.

**Hazardous substances** also have a serious impact on plumbing workers' health. These may come in the form of liquids, gases, vapours, fumes or dusts. They are contained in a variety of commonly used products and materials in construction. The main exposure route is through inhaling them, but substances such as solvents can also be absorbed through the skin. There may even be some additional exposure from ingestion due to poor hygiene and welfare facilities on site.

Commonly used hazardous substances are:

#### **Vapours and fumes**

**Solvents** of many different kinds are used in paints, varnishes, lacquers or adhesives, sometimes several are used in a single product. They can cause central nervous system damage and can harm the skin, liver, kidneys and the cardio vascular system and some increase the likelihood of cancer.

**Isocyanates** such as TDI and MDI. Used in two pack polyurethane paints and varnishes, bonding agents and resins, paints. These can cause asthma, dermatitis and, in the long term, are associated with cancer and reproductive hazards.

**Pesticides, such as insecticides or fungicides.** Pesticides are poisons. They are used in timber treatments to protect them from insect infestation or from the elements. Commonly used and dangerous ones are: Lindane, TBTO (tri- butyl tin oxide), PCP (penta-chloro phenol) or CCA compounds (copper, chrome, arsenic). Chemical treatments for damp courses and fire retardants can also be hazardous.



**Welding fumes,** welding can generate a cocktail of metal fumes of all kinds, depending on what is being welded - painted metals, brass, copper, steel, coated rods, alloys, and so on. Fumes (such as chromium oxide, zinc oxide, or lead to give a few examples) can cause serious health problems in the long term. The respiratory system is affected and, as chemicals are absorbed, they can slowly affect the brain and internal organs.

**Dust**

## Dust

All dust is bad for your health. There are higher death rates from respiratory disease, lung and stomach cancers in dusty trades. Dust affects all sites and all trades, but is especially problematic in plastering, demolition, excavations, tunnelling and in certain tasks, such as cutting concrete blocks. Low cost solutions are to get materials pre-cut off site where exhaust ventilation can be used, and to dampen work and isolate dusty work. Good hygiene facilities for washing and changing and proper protective clothing are needed for hazardous jobs, and this is seldom the case in developing countries.



Ideally, exhaust ventilated tools, and tools fitted with a water supply for dust suppression should be used. Respiratory Protective Equipment needs to be selected carefully as different types give widely varying standards of protection. Unfortunately, what is normally given out as PPE is a "dust mask" made of paper or cloth, rather than filtering respirator masks.

Cement dust can cause serious respiratory problems over time. Cutting concrete blocks can generate huge clouds of silica -containing dust. Cement contains lots of chemicals, some of which cause skin problems: lime (calcium oxide), which can cause burns from wet concrete and mortars. These burns can be severe enough to need skin grafts. Chromates, which cause dermatitis from contact with cement in both wet and dry states. This is a very widespread problem. Irritant, or contact, dermatitis is direct damage caused by contact with the skin. Allergic dermatitis is caused by sensitivity to the chromate impurities in cement and can be severe. Once a person is sensitised it is almost impossible to get rid of the allergic reaction.

## Confined Space

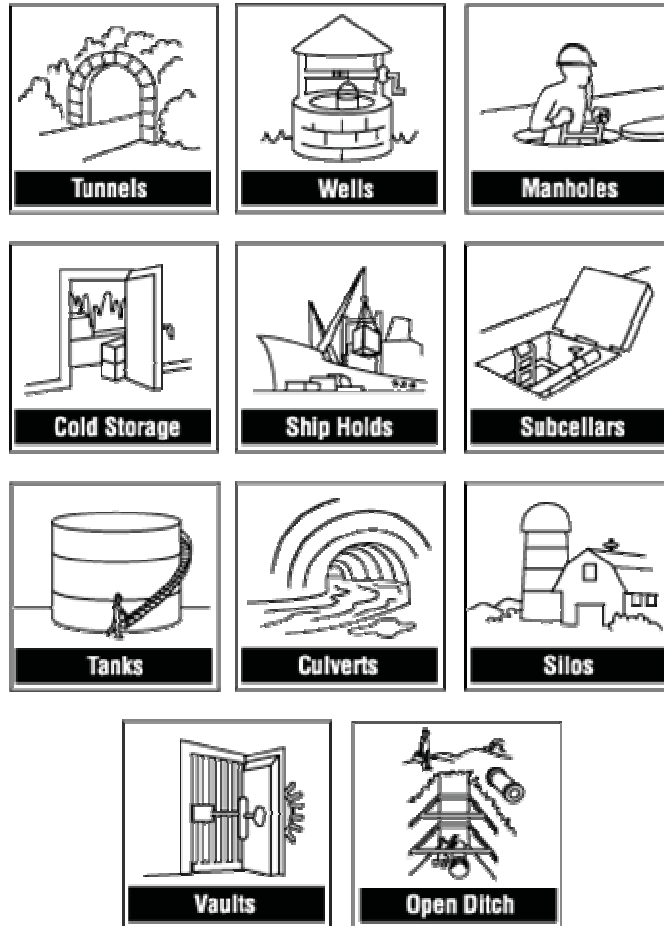
Many workers are injured and killed each year while working in confined spaces. An estimated 60% of the fatalities have been among the would-be rescuers. A confined space can be more hazardous than regular workspaces for many reasons.

### What is a confined space?

Generally speaking, a confined space is an enclosed or partially enclosed space that: is not primarily designed or intended for human occupancy has a restricted entrance or exit by way of location, size or means or Can represent a risk for the for the health and safety of anyone who enters, due to one or more of the following factors:

- ✦ its design, construction, location or atmosphere
- ✦ the materials or substances in it
- ✦ work activities being carried out in it, or the
- ✦ mechanical, process and safety hazards present

Confined spaces can be below or above ground. Confined spaces can be found in almost any workplace. A confined space, despite its name, is not necessarily small. Examples of confined spaces include silos, vats, hoppers, utility vaults, tanks, sewers, pipes, access shafts, truck or rail tank cars, aircraft wings. Ditches and trenches may also be a confined space when access or egress is limited. Roof spaces and crawl spaces underneath homes should also be considered as a confined space.



### What are the hazards in a confined space?

All hazards found in a regular workspace can also be found in a confined space. However, they can be even more hazardous in a confined space than in a regular worksite.

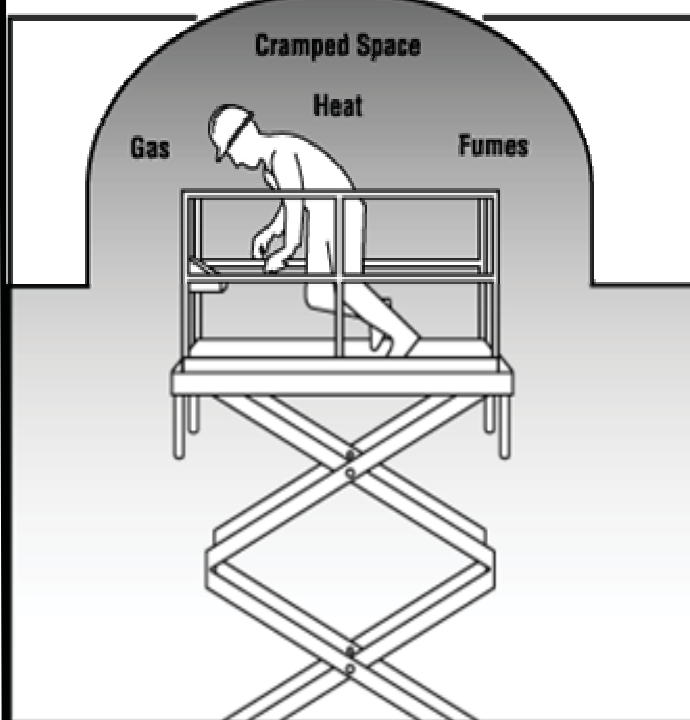
Hazards in confined spaces can include:

- Poor air quality: There may be an insufficient amount of oxygen for the worker to breathe. The atmosphere might contain a poisonous substance that could make the worker ill or even cause the worker to lose consciousness. Natural ventilation alone will often not be sufficient to maintain breathable quality air.
- Chemical exposures due to skin contact or ingestion as well as inhalation of 'bad' air.
- Fire Hazard: There may be an explosive/flammable atmosphere due to flammable liquids and gases and combustible dusts which if ignited would lead to fire or explosion.
- Process-related hazards such as residual chemicals, release of contents of a supply line.
- Noise.

- Safety hazards such as moving parts of equipment, structural hazards, entanglement, slips, falls.
- Radiation.
- Temperature extremes including atmospheric and surface.
- Shifting or collapse of bulk material.
- Barrier failure resulting in a flood or release of free-flowing solid.
- Uncontrolled energy including electrical shock.
- Visibility.
- Biological hazards.

#### **What precautions should I take in a confined space?**

**Skylight Area**



No one should enter a confined space without completing confined space training. Contact WorkCover NSW or Master Plumbers Association of NSW about completing confined space training and obtaining your confined space ticket or card.

#### **Why is working in a confined space more hazardous than working in other workspaces?**

Many factors need to be evaluated when looking for hazards in a confined space. There is a smaller margin for error. An error in identifying or evaluating potential hazards can have more serious consequences. In some cases, the conditions in a confined space are always extremely hazardous. In other cases, conditions are life threatening under an unusual combination of circumstances. This variability and unpredictability is why the hazard assessment is extremely important and must be taken very seriously each and every time one is done.

Some examples include:

- The entrance/exit of the confined space might not allow the worker to get out in time should there be a flood or collapse of free-flowing solid.
- Self-rescue by the worker is more difficult.
- Rescue of the victim is more difficult. The interior configuration of the confined space often does not allow easy movement of people or equipment within it.
- Natural ventilation alone will often not be sufficient to maintain breathable quality air. The interior configuration of the confined space does not allow easy movement of air within it.
- Conditions can change very quickly.
- The space outside the confined space can impact on the conditions inside the confined space and vice versa.
- Work activities may introduce hazards not present initially.

## Welfare and biological hazards.

Plumbers are the protectors of public health. However, there is some risk to workers from entering areas of biological hazards see confined space. 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 cryptosporium .

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

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.



# Plumbing Tools

## HAZARD RECOGNITION

Tools are such a common part of our lives that it is difficult to remember that they may pose hazards. All tools are manufactured with safety in mind but, tragically, a serious incident often occurs before steps are taken to search out and avoid or eliminate tool-related hazards.

In the process of removing or avoiding the hazards, workers must learn to recognize the hazards associated with the different types of tools and the safety precautions necessary to prevent those hazards.

## HAND TOOLS

Hand tools are non-powered. They include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance.



Some examples:

- Using a screwdriver as a chisel may cause the tip of the screwdriver to break and fly, hitting the user or other employees.
- If a wooden handle on a tool such as a hammer or an axe is loose, splintered, or cracked, the head of the tool may fly off and strike the user or another worker.
- A wrench must not be used if its jaws are sprung, because it might slip.
- Impact tools such as chisels, wedges, or drift pins are unsafe if they have mushroomed heads. The heads might shatter on impact, sending sharp fragments flying.

The employer is responsible for the safe condition of tools and equipment used by employees but the employees have the responsibility for properly using and maintaining tools.

Employers should caution employees that saw blades, knives, or other tools be directed away from aisle areas and other employees working in close proximity. Knives and scissors must be sharp. Dull tools can be more hazardous than sharp ones.

Appropriate personal protective equipment, e.g., safety goggles, gloves, etc., should be worn due to hazards that may be encountered while using portable power tools and hand tools.

Safety requires that floors be kept as clean and dry as possible to prevent incidental slips with or around dangerous hand tools.

Around flammable substances, sparks produced by iron and steel hand tools can be a dangerous ignition source. Where this hazard exists, spark-resistant tools made from brass, plastic, aluminum, or wood will provide for safety.

## POWER TOOL PRECAUTIONS

Power tools can be hazardous when improperly used. There are several types of power tools, based on the power source they use: electric, pneumatic, liquid fuel, hydraulic, and powder-actuated.

Employees should be trained in the use of all tools - not just power tools. They should understand the potential hazards as well as the safety precautions to prevent those hazards from occurring.

The following general precautions should be observed by power tool users:

- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Keep cords and hoses away from heat, oil, and sharp edges.
- Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits and cutters.
- All observers should be kept at a safe distance away from the work area.
- Secure work with clamps or a vice, freeing both hands to operate the tool.
- Avoid incidental starting. The worker should not hold a finger on the switch button while carrying a plugged-in tool.
- Tools should be maintained with care. They should be kept sharp and clean for the best performance. Follow instructions in the user's manual for lubricating and changing accessories.
- Be sure to keep good footing and maintain good balance.
- The proper apparel should be worn. Loose clothing, ties, jewellery can become caught in moving parts.
- All portable electric tools that are damaged shall be removed from use and tagged "Do Not Use."

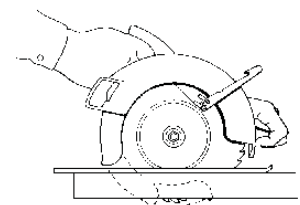


## GUARDS

Hazardous moving parts of a power tool need to be safeguarded. For example, belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded if such parts are exposed to contact by employees.

Guards, as necessary, should be provided to protect the operator and others from the following:

- point of operation,
- in-running nip points,
- rotating parts, and
- flying chips and sparks.



Safety guards must never be removed when a tool is being used. For example, portable circular saws must be equipped with guards. An upper guard must cover the entire blade of the saw. A retractable lower guard must cover the teeth of the saw, except when it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work.

## SAFETY SWITCHES

The following hand-held powered tools must be equipped with a momentary contact "on-off" control switch: drills, tappers, fastener drivers, horizontal, vertical and angle grinders with wheels larger than 2 inches in diameter, disc and belt sanders, reciprocating saws, saber saws, and other similar tools. These tools also may be equipped with a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

The following hand-held powered tools may be equipped with only a positive "on-off" control switch: platen sanders, disc sanders with discs 2 inches or less in diameter; grinders with wheels inches or less in diameter; routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks 2 inches wide or less.

Other hand-held powered tools such as circular saws having a blade diameter greater than 2 inches, chain saws, and percussion tools without positive accessory holding means must be equipped with a constant pressure switch that will shut off the power when the pressure is released.

## ELECTRIC TOOLS

Employees using electric tools must be aware of several dangers; the most serious is the possibility of electrocution.

Among the chief hazards of electric-powered tools are burns and slight shocks which can lead to injuries or even heart failure. Under certain conditions, even a small amount of current can result in fibrillation of the heart and eventual death. A shock also can cause the user to fall off a ladder or other elevated work surface.

To protect the user from shock, tools must either have a three-wire cord with ground and be grounded, be double insulated, or be powered by a low-voltage isolation transformer. Three-wire cords contain two current-carrying conductors and a grounding conductor. One end of the grounding conductor connects to the tool's metal housing. The other end is grounded through a prong on the plug. Anytime an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong should never be removed from the plug.

Double insulation is more convenient. The user and the tools are protected in two ways: by normal insulation on the wires inside, and by a housing that cannot conduct electricity to the operator in the event of a malfunction.

These general practices should be followed when using electric tools:

- Electric tools should be operated within their design limitations.
- Gloves and safety footwear are recommended during use of electric tools.
- When not in use, tools should be stored in a dry place.
- Electric tools should not be used in damp or wet locations.
- Work areas should be well lighted.



## POWERED ABRASIVE WHEEL TOOLS

Powered abrasive grinding, cutting, polishing, and wire buffing wheels create special safety problems because they may throw off flying fragments.

Before an abrasive wheel is mounted, it should be inspected closely and sound- or ring-tested to be sure that it is free from cracks or defects. To test, wheels should be tapped gently with a light non-metallic instrument. If they sound cracked or dead, they could fly apart in operation and so must not be used. A sound and undamaged wheel will give a clear metallic tone or "ring."

To prevent the wheel from cracking, the user should be sure it fits freely on the spindle. The spindle nut must be tightened enough to hold the wheel in place, without distorting the flange. Follow the manufacturer's recommendations. Care must be taken to assure that the spindle wheel will not exceed the abrasive wheel specifications.

Due to the possibility of a wheel disintegrating (exploding) during start-up, the employee should never stand directly in front of the wheel as it accelerates to full operating speed.

Portable grinding tools need to be equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of breakage.

In addition, when using a powered grinder:

- Always use eye protection.
- Turn off the power when not in use.
- Never clamp a hand-held grinder in a vise.



## PNEUMATIC TOOLS

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders. There are several dangers encountered in the use of pneumatic tools. The main one is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.

Eye protection is required and face protection is recommended for employees working with pneumatic tools. Noise is another hazard. Working with noisy tools such as jackhammers requires proper, effective use of hearing protection. When using pneumatic tools, employees must check to see that they are fastened securely to the hose to prevent them from becoming disconnected. A short wire or positive locking device attaching the air hose to the tool will serve as an added safeguard.

A safety clip or retainer must be installed to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel.

Screens must be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills. Compressed air guns should never be pointed toward anyone. Users should never "dead-end" it against themselves or anyone else.



## **POWDER-ACTUATED TOOLS**

Powder-actuated tools operate like a loaded gun and should be treated with the same respect and precautions. In fact, they are so dangerous that they must be operated only by specially trained employees.

Safety precautions to remember include the following:

- These tools should not be used in an explosive or flammable atmosphere.
- Before using the tool, the worker should inspect it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions.
- The tool should never be pointed at anybody.
- The tool should not be loaded unless it is to be used immediately. A loaded tool should not be left unattended, especially where it would be available to unauthorized persons.
- Hands should be kept clear of the barrel end. To prevent the tool from firing incidentally, two separate motions are required for firing: one to bring the tool into position, and another to pull the trigger. The tools must not be able to operate until they are pressed against the work surface with a force of at least 5 pounds greater than the total weight of the tool.

If a powder-actuated tool misfires, the employee should wait at least 30 seconds, then try firing it again. If it still will not fire, the user should wait another 30 seconds so that the faulty cartridge is less likely to explode, then carefully remove the load. The bad cartridge should be put in water.

Suitable eye and face protection are essential when using a powder-actuated tool.

The muzzle end of the tool must have a protective shield or guard centered perpendicularly on the barrel to confine any flying fragments or particles that might otherwise create a hazard when the tool is fired. The tool must be designed so that it will not fire unless it has this kind of safety device.

All powder-actuated tools must be designed for varying powder charges so that the user can select a powder level necessary to do the work without excessive force.

If the tool develops a defect during use it should be tagged and taken out of service immediately until it is properly repaired.

## **FASTENERS**

When using powder-actuated tools to apply fasteners, there are some precautions to consider. Fasteners must not be fired into material that would let them pass through to the other side. The fastener must not be driven into materials like brick or concrete any closer than 3 inches to an edge or corner. In steel, the fastener must not come any closer than one-half inch from a corner or edge. Fasteners must not be driven into very hard or brittle materials which might chip or splatter, or make the fastener ricochet.

An alignment guide must be used when shooting a fastener into an existing hole. A fastener must not be driven into a spalled area caused by an unsatisfactory fastening.

## **HYDRAULIC POWER TOOLS**

The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed.

The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings

must not be exceeded.

## **JACKS**

All jacks - lever and ratchet jacks, screw jacks, and hydraulic jacks - must have a device that stops them from jacking up too high. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack and should not be exceeded.

A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up.

Use wooden blocking under the base if necessary to make the jack level and secure. If the lift surface is metal, place a 1-inch-thick hardwood block or equivalent between it and the metal jack head to reduce the danger of slippage.

To set up a jack, make certain of the following:

- the base rests on a firm level surface,
- the jack is correctly centered,
- the jack head bears against a level surface, and
- the lift force is applied evenly.

Proper maintenance of jacks is essential for safety. All jacks must be inspected before each use and lubricated regularly. If a jack is subjected to an abnormal load or shock, it should be thoroughly examined to make sure it has not been damaged.

Hydraulic jacks exposed to freezing temperatures must be filled with an adequate antifreeze liquid.

## **GENERAL SAFETY PRECAUTIONS**

Employees who use hand and power tools and who are exposed to the hazards of falling, flying, abrasive and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases must be provided with the particular personal equipment necessary to protect them from the hazard.

All hazards involved in the use of power tools can be prevented by following five basic safety rules:

- Keep all tools in good condition with regular maintenance.
- Use the right tool for the job.
- Examine each tool for damage before use.
- Operate according to the manufacturer's instructions.
- Provide and use the proper protective equipment.

Employees and employers have a responsibility to work together to establish safe working procedures. If a hazardous situation is encountered, it should be brought to the attention of the proper individual immediately.



## Manual Handling Injuries

Incorrect manual handling can cause different types of injuries. Long-term injuries can include damage to the spine and joints. Short-term injuries include sprained ligaments or torn/strained muscles.

Have a look at the different types of injuries you can get from incorrect manual handling. Click on the arrows pointing to the different parts of the body to find out how these body parts can be damaged by unsafe manual handling.

|                                                                                    |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |    | <b>Neck</b><br>Neck muscles can be strained or torn if: <ul style="list-style-type: none"> <li>• heavy loads are not lifted properly</li> <li>• sudden jerky movements are made while handling heavy loads</li> <li>• loads are carried for a long period of time.</li> </ul> Getting a sore neck is a sign that you may have damaged your neck muscles.                                                                                                                                                                                                   |
|                                                                                    |   | <b>Shoulder</b><br>Shoulder muscles can be strained when a heavy load is lifted, carried, pushed or pulled. This can lead to soreness in your shoulders. If this continues, then you should stop handling any heavy loads and have a rest. Always carry loads close to your body to avoid straining your shoulders.                                                                                                                                                                                                                                        |
|                                                                                    |  | <b>Chest</b><br>Lifting, carrying, pushing and pulling loads can strain the muscles of your chest. A sign of strain is a feeling of soreness in your chest. To prevent this, make sure you follow the correct methods for handling heavy loads and always carry a load close to your body to avoid strained muscles.                                                                                                                                                                                                                                       |
|                                                                                    |  | <b>Lower Back</b><br>Injury to the lower back is caused by incorrect lifting and carrying of heavy loads. A warning sign of this injury is a twinge in the back but usually there are no immediate warning signs. Your back just gets sore a day or so later.<br><br>A back injury can take a long time to heal and can affect your ability to work, so make sure that you always follow safe lifting and carrying methods when handling loads. You should always keep your back straight when lifting, carrying, pushing or pulling to avoid damaging it. |
|                                                                                    |  | <b>Knees</b><br>Incorrect lifting could damage your knee joints. Always bend your knees when you need to get down to grip a load, then straighten your legs to lift the load. Try and avoid getting into a full squat position when you do this, or you could hurt your knees.                                                                                                                                                                                                                                                                             |

## Preparing for a Manual Handling Task

There are a few easy steps you can follow to make sure that you're ready for a manual handling task.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Warm up</b><br><br>Just as you'd warm up before taking part in sports or exercise, you need to warm up before you handle a heavy load.                                                                                                                                                                                                                                                                                                                     |   |
| <b>Check the load</b><br>Have a good look at the load. Check for: <ul style="list-style-type: none"><li>• areas where you can get a firm grip on the load</li><li>• the overall size and shape of the load</li></ul> the weight of the load - you should only try and manually handle loads that are less than 20 kilograms. Loads of more than 20 kilograms should not be manually lifted. You should use equipment such as a fork lift to move these loads. |   |
| <b>Move yourself into position</b><br><br>Get close to the load and put yourself in the best position to handle the load.                                                                                                                                                                                                                                                                                                                                     |  |

## Preparing for a Manual Handling Task

There are different methods for safe manual handling. These depend on the manual handling task you have to do. Each task below has its own separate section so that you can find out more about these methods.



Lifting



Pushing/Pulling



Carrying



Moving

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## Safe Lifting Methods

If the manual handling risk cannot be eliminated and it is not practicable to use mechanical aids, use the correct safe lifting technique to help prevent injury.

### Plan the Lift

- Try to break down the load into smaller parts.
- Check the pathway for any obstacles and clear these. Check if any doors need to be opened
- Test the weight of the load by lifting one corner. If it is too heavy or awkward, stop and request help



### Performing the Lift

- Stand with feet shoulder width apart and in a staggered stance
- Move in close to the load
- Bend your knees, keep your head upright and maintain the spine's natural curves
- Pull the load close to your body
- Secure your grip
- Use a smooth controlled motion to lift the load
- Avoid twisting or turning your body when lifting and be sure to use your feet to change direction

### Setting the Load Down

- Stand with your feet apart and in a staggered stance
- Get as close as possible to the area you will place the load
- Bend your knees, keep your head upright and maintain the spine's natural curves
- Keep the load close
- Once the load is where you want it release your grip. Always ensure that the load is secured before you release your grip

### Team Lifting

- Before undertaking a team lift it is important to establish emergency commands should one of you experience difficulty during the exercise
- If you are lifting a load with a team member(s) it is vital to keep communicating with that person(s) and tell them of any action you are about to take such as lowering or adjusting the load.

### Remember

- 'Keep the Load Close'
- 'Keep the Natural Curves of your Spine' to help prevent injury
- Remember that you should never try to lift loads that are over 20 kilograms!
- You should also never bend down to pick up a load.

## Safe pushing / pulling methods

Pushing or pulling a heavy object puts a twisting strain on the body. This can increase the risk of injury.

- Get a good grip on the object
- Keep your back as straight as possible
- Position your feet to avoid slipping
- Bend your knees



If you must move an object that is too heavy or hard to handle use a team lift or mechanical aid.

## Safe carrying methods

Carrying heavy objects can put a strain on your back, arms, shoulders and knees because your body is struggling to support the size and weight of the object.

- Never twist your body, change direction by moving your feet
- Always have clear vision and you should not trip over or bump into anything
- Slide or push the load, it is a lot easier than carrying
- Placing a load into a ute, put it on the edge and slide it into the back of the ute
- Always carry the load close to your body



**Never carry a heavy load away from your body as this puts a lot of strain on your shoulders and back.**

## Moving heavy loads safely

You may need to move loads that are too heavy for you to lift or carry. In these cases, you may need to use some of these methods:

- If possible break down the load into smaller components
- Work with someone to carry the load
- Use a trolley

**Use a forklift or trolley jack to lift loads that are too heavy to lift manually (over 20 kilograms).**



## Manual handling tips for the plumbing industry

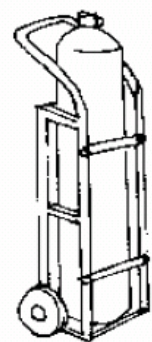
### Techniques for Safe Manual Handling of Gas Cylinders

#### *Loading gas cylinder on trolley*

- Wear steel toe capped shoes and industrial quality gloves
- Undo securing bars on trolley and slide it near the cylinder
- Unhook chain from rack and place palm of hand on top of cylinder neck, get a firm grip
- Tilt cylinder slightly forward so it rests on the rim of the base and use the other hand to rotate cylinder 'milk churning' it from rack to trolley

#### *Pushing trolley and unloading gas cylinder*

- Fasten securing bars on the trolley
- Place one foot on the axle and tilt the trolley back so it balances comfortably on the wheels
- Keeping back straight, push trolley and set it down in front of the laboratory bench
- Remove cylinder from trolley, milk churning it into its new position and clamp it securely to the bench using chains or straps.



## Safe Digging

Digging and excavating may be done by hand or with excavating equipment. Before you dig, ensure that there are no underground hazards such as pipes or utilities; don't assume the area is clear. Get training on the use and maintenance of excavating equipment and inspect it before each use.

*Shovelling is a manually intensive task and there have been many injuries resulting from performing this task. There are a lot of variations in the task, including:*

- Shovel type (eg. trench or short shaft).
- Task (eg. trench work, cleaning around machinery)
- Operator (varying levels of fitness and training).
- Job demands (eg. occasional shovel work or very frequent).

### Common Manual Handling Hazards Associated with Shovel Work

- Repetitive extended reach forwards. This increases the strain on the lower back (refer to Figure 1). Eg., shovelling under conveyors.
- Highly repetitive shovelling increases accumulated fatigue on the job. Eg. if there is not rotation to different tasks during the task.



Figure 1: Poor shovelling technique. Extended reach forward.

- Overloading the shovel blade this places excessive leverage and strain on the person. Particularly for longer shafted shovels.
- Poor Shovelling techniques. Eg. throwing the material behind the operator. This causes excessive twisting and bending of the operator's spine. (refer to Figure 1).

**Can the Shovelling Task Be Eliminated** Eg. Is there double handling of the material? Eg. Shovelling to clean out under conveyors. If the material can be contained and not drop on the ground the shovelling will be eliminated.

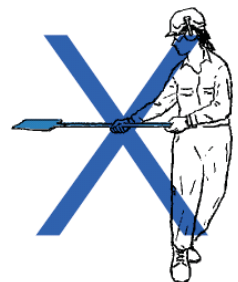


Figure 2: Poor shovelling technique. Twisting the body.

This information maybe useful to evaluate existing shovels or to assess new shovels prior to purchase.

**Blade Size:** Larger blade on short shafted shovels (refer to figure 6). Longer shaft shovels

(eg. French shovels) have smaller blade (refer to figure 3, 4 and 5).

**"Flat Blade"** Having the blade the same angle as the shaft (refer to figure 3) reduces operator fatigue when digging or breaking up soil of ground height.

**"Angled Blade"** Having the shaft and blade at a 40 - 45 degree angle is better for picking up material from the ground. This is because when the blade is parallel to the ground the shaft is at 450 which requires less bending for the operator to hold the shovel.

**Blade Sharpness:** The sharper the edge of the blade the less effort will be required by the user

to push the blade through materials. Especially soil and finer grain sands.

**Shaft Length:** Longer shafted handles are better for working at ground height or down trenches. The longer shaft means that the operator does not have to bend as much.

Having a bend in the shaft also reduces forward bending even more (refer to figure 5).

**Shaft Materials:** Many aluminium shafted shovels are lighter and need less physical effort to use the shovel compared to heavier wooden or other metal shafted shovels.

**Grip:** A softer grip on the shaft of the handle will make it easier to hold, absorb some of the impact on the palm of the hand and reduce heat transmission on hot days.

**Handle Shape:** A "D" shaped end on the shaft of the handle is used for more power when lifting and turning the shovel.

**Using the right shovelling technique is one of the most important aspects for the safety of this task. Because the shovelling scenarios, operators and shovels are so varied, it is difficult to specify specific methods of shovelling that will suit all people in every situation. A more practical approach is to provide some general guidelines on the techniques such as supplied in this fact sheet and then train people to apply these principles in practically orientated training for the work they are performing.**

If you use manual digging tools, ensure they are the proper size and weight for you to use them properly; always use the correct shovel and ensure that shoring is used when required. Excavations deeper than 5 feet should be shored with supports such as timber or metal struts and hydraulic jacks to avoid a collapse. (Note: Sloping is another safety measure for trenches.) Inspect the shoring equipment before each use; deteriorated timber or metal struts and faulty jacks should not be used. After the trench is excavated, mark the area clearly to prevent falls.

Plumbing work often involves working in these trenches. When working inside a trench use good body mechanics and proper lifting techniques when moving items. When possible, use mechanical lifting equipment to extract heavy pipes etc.

Use appropriate personal protective equipment (PPE) such as steel-toed boots and sturdy work gloves. When mixing and applying chemicals, use chemical safety precautions such as safety goggles, impermeable coveralls, chemical-resistant gloves and respiratory protection.

Practice field safety including sun protection and taking precautions for cold and heat stress. Learn about hazardous pests such as wasps, bees and snakes and the appropriate response and first aid for stings and bites. Avoid slips, trips and falls by moving cautiously through the landscape and being aware of uneven ground.



Figure 3: Shovel Type 1:  
Trench shovel with a flat blade.



Figure 4: Shovel Type 2:  
Trench shovel with an angled blade.



Figure 5: Trench shovel.  
A bend in the shaft to  
reduce forward bending.

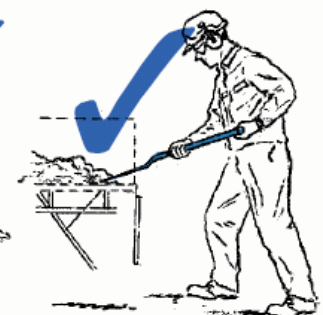


Figure 6: Short shafted shovel.

## Other Plumbing Hazards & Safety Equipment

### PERSONAL PROTECTIVE EQUIPMENT

**HARD HATS**-Hard Hats will be worn through all phases of construction. Hard hats will be worn with the bill or peak forward.

**CLOTHING**-Loose fitting clothing, garments, shirt tails or floppy sleeves will be contained. No dangling jewellery will be worn. Tank tops, low cut shirts or sleeveless shirts are NOT permitted. Shirts will have a minimum of a 4 inch sleeve. Long pants (no shorts) will be worn.

**FOOTWEAR**- Substantial leather footwear will be worn, preferably full height boots, Shoes resembling gym shoes will not be permitted.

**HEARING**-Hearing protection will be required whenever using equipment such as air tools, grinders, chippers, power actuated tools, etc. The site will be monitored and when decibel levels exceed 80 dba, the Contractor must begin to enforce a rigid hearing protection program.

**EYE AND FACE**-Eye and face protection is required whenever working in dusty conditions, using high pressure air or using equipment or material that could damage your eyes. Examples of these are overhead drilling or cutting, chipping, welding, burning mixing or working with cleaners, grinding, etc. Whenever working with bell or disk grinders, abrasive cutting disks or band saws, a full face shield will be added to safety glasses.

**RESPIRATORS**-Respirators may be required. If respirators are needed, or if you feel that you may benefit from use (dusty air), speak with your supervisor about it. If work is to be done in an area where respirators are required, the employee must receive special training in the use and care of the respirator.

**FALL PROTECTION**-See "Work on Elevated Surfaces" in this section.

**HAIR**-Hair which falls below the nape of the neck must be put up under the hard hat or contained in a hair net. Pony tails are not considered proper containment of long hair.

### WORKING ON ELEVATED SURFACES

Any time employees are working on an elevated surface, next to floor or wall openings or on roofs, the possibility of injury from a fall does exist. Each situation must be evaluated by the competent person to determine what type of fall protection should be used. Many types of fall protection do exist; static lines, rope grab, guard rails and cables, lanyards, harnesses, retractable lines. Each device has a specific purpose and use.

In most situations, when personal fall protection is required, safety harnesses with shock absorbing lanyards attached will be used. There are times when the limited use of safety harnesses with standard lanyards or rebar chain assemblies is acceptable.

**When Personal Fall Protection is required, these rules must be followed:**

- Equipment will be used for its intended purpose only.
- safety harnesses are to be used for positioning or for fall protection when the potential for a fall exists, shock absorbing lanyard are used when a fall from a elevation is possible, and other lanyards are for positioning only.
- All attachments will be made as high as possible and to a substantial structural member capable of supporting 5000 pounds for each person attached. Perimeter cables and guard rail systems are not to be used as attachment points for fall protection.



- Lanyard attachments (fall protection) should be made so as to:
  - limit the fall distance to less than 6 feet
  - avoid striking material or structures which may be below
  - "lateral swing" in the event of a fall
  - reduce the arresting force to 1800 pounds for full body harness
  - all hook attachments should be of the locking design
  - lanyard attachments (positioning) are to be made so as to:
    - limit the fall distance to 2 feet or less
    - reduce the arresting force to 900 pounds for body belts
    - all hook attachments should be of the locking design
- All equipment should be inspected daily by the employee for signs of wear. Any wear which may comprise the integrity of the equipment should be noted. New equipment should be correctly recorded and the issued.
- If a fall does occur, inform the supervisor of the incident. Any equipment that is subject to the forces of the fall must be removed from service and returned to the Safety Coordinator or licensed plumber.
- If any time an employee feels unsure about a work situation that could expose them to a fall, they must discuss it with the supervisor. If appropriate, additional fall protection equipment and training should be provided.

## **EXCAVATIONS**

No worker should enter a trench unless it has been inspected and determined, by a "Competent Person" to be properly excavated, protected by an appropriate system, and safe for entry on a daily basis.

The "Competent Person" should determine if the trench is a "confined space". If this is determined, the "Confined Space Entry Program" within the Safety and Health Program should be referenced.

Each worker should have the responsibility to stop work and notify others if they perceive that a problem with the excavation or protection system exists or develops.

Excavations should be back-filled as soon as possible after the completion of work. If they cannot be back-filled, appropriate flagging and barricading should be installed to protect workers, pedestrians and traffic. All trench shields should be marked with the model or design number of that box.

## **HOUSEKEEPING**

Effective housekeeping is not generally an assigned task, but should be considered part of each worker's responsibility. Keeping the work site clean not only produces a safer job site, but a better place to come to work each day. It is each worker's responsibility to keep their work area in order, cleaning up during and after each day's work is complete.

[Glass drinking bottles should not be permitted on a job site.](#)

## **COMPRESSED GAS CYLINDERS**

- Compressed gas cylinders shall be secured in an upright position at all times.
- When transporting, moving or when cylinders are stored, they must have valve caps in place and tightly secured. Do not lift cylinders with magnets or by the cap. Transportation of cylinders should be done only in an approved cart.
- Do not allow electrical cords or temporary power cords to come close to or be in contact with cylinders. Keep cylinders away from sparks, flames or other sources of heat or ignition.

- Oxygen cylinders in storage should be separated from fuel gasses by 20 feet or by a 5 foot high half-hour rated fire wall. They shall be stored in a well ventilated area outside of enclosed structures.
- Signs indicating what gasses are being stored and "NO SMOKING" should be prominently displayed. Do not smoke within 20 feet of a compressed gas cylinder storage area.



### WELDING AND BURNING

- All personnel using gas welding or burning equipment should be fully trained in the use and maintenance of the equipment.
- A dry chemical ABC fire extinguisher should be within 20 feet of any burning or welding operation.
- To be sure that there is no sign of damage, inspect all hoses, torch heads, cylinders and regulators before connecting.
- Do not use compressed gas to clean yourself or your clothing.
- Keep oil and grease off and away from all welding equipment.
- When burning is complete, disassemble all equipment and store in a clean dry place.



### FLAMMABLE LIQUIDS

- Flammable liquids should not be stored within closed structures, i.e. buildings under construction, storage trailers or tool sheds.
- Flammable liquids should be stored in and dispensed from original containers. They must be made of metal, have a self closing lid and a wire mesh flame arrester.
- If the can is damaged in any way, do not use it.
- An MSDS should be held for all flammable liquids
- Never store flammable or combustible materials in stairways, or near building exits/entrances.
- When refueling engines, shut down the engine and wait for the engine to cool down before fueling.



### MATERIAL HANDLING

- When lifting material, lift with your legs not with your back. If the material is heavy or awkward (hard to hold on to), get help from someone.
- When lifting heavy or awkward material or making repetitive lifts, where possible, use powered equipment.
- Equipment used for moving or lifting material should never be used beyond it's capacity.
- Watch your footing, particularly when moving material. When carrying, it is not always easy to see clearly what is in front of you. Check and clear your path before moving material.
- Be sure that when stacking material, the piles are kept neat and orderly and that they are stacked in a manner so as to prevent the stacks from falling.
- Inspect chains, slings and ropes daily. If they are found to be worn or damaged, return them to the supervisor or licensed plumber for disposal or repair.
- Always use tag lines to guide loads being moved by crane.

## BARRICADING AND FLAGGING

- Sufficient "barricade" fencing should be installed to separate active construction areas or hazardous areas from active occupied work areas and to protect the public. The fence must be sufficiently supported with appropriate signs posted.
- Where temporary protection is needed, fencing may be three foot high, supported by posts or stanchions.
- All signs should be no less than 9 x 12 on plastic.
- Signs and barricades must be removed immediately when no longer useful or required.

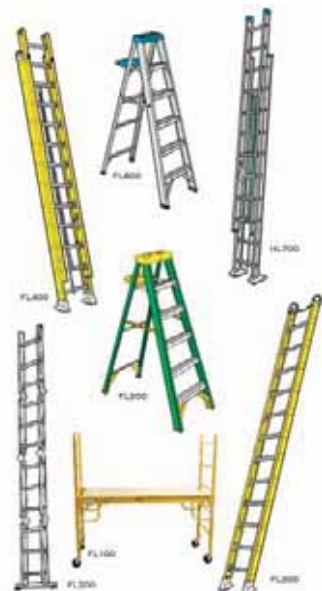


## ELECTRICAL SAFETY

Prior to use, all tools and extension cords should be checked to see that they are in good repair. If they are damaged, they must be removed from service.

## SCAFFOLDING-LADDERS-STAIRWAYS

- Scaffolding should be installed only by a competent person.
- Scaffolds 4 feet or more in height, having a minimum horizontal dimension in either direction of less than 60 inches, shall have standard guardrails installed on all open sides and ends of the platform, outrigger stabilizers shall be installed, an access ladder or equivalent safe access shall be provided. The scaffold must be fully assembled with all components, and have the wheels in the locked position whenever anyone is on the scaffold.
- All scaffolds must be complete with a fully decked work surface, complete guard rail system and be constructed without members or components missing.
- Do not use cross-bracing as access scaffolding. Ladders must be used.
- Straight ladders must be set up with a 4:1 slope and must be secure at the top. If there is damage to the ladder, tell the supervisor immediately so it can be removed from service and replaced. Extend the top of the ladder 36 inches (minimum) above the landing.



**Stairways must be kept free of flammable materials and trash.**

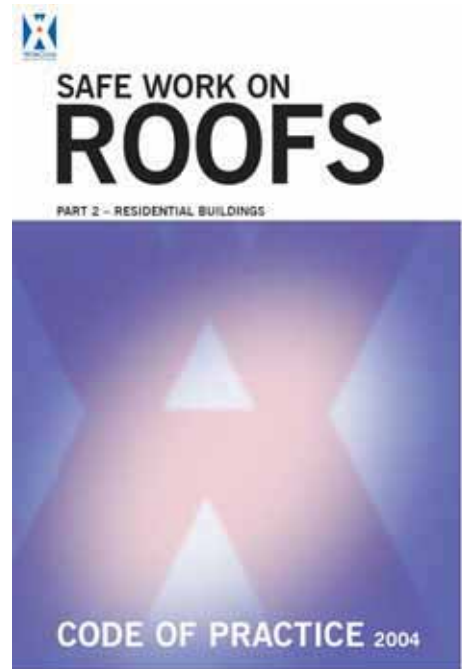
## OPEN SIDED FLOORS/WALL OPENINGS

- Whenever floor decks are six feet or more from the ground or a lower level, they should have a complete guard rail system. It must include a top rail, mid rail and toe board.
- If working on a elevated work surface (wall forms, column forms, etc.). Where guard rail systems are not possible or practical, safety belts, harnesses and lanyards with locking hooks must be used. When using a safety harness, be sure the lanyard is attached to the "D" ring at the middle of the back or to BOTH side "D" rings.

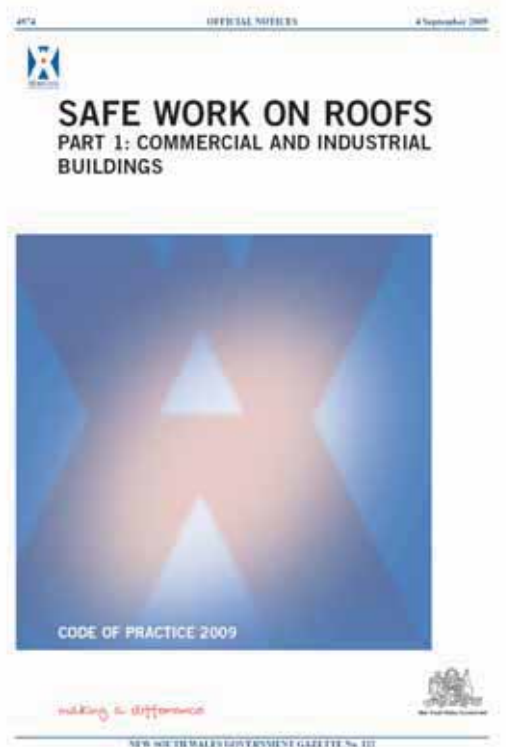
## Working of Roofs

The most effective solution to reduce the risk of injury is not to have to work at height.

- For major roof work (e.g. if you need to carry up heavy materials or equipment, use a stable access platform (such as a scaffold access tower which includes a temporary stairway).
- If work is required to be performed on the roof provide edge protection to prevent people falling from the roof.
- Do not walk across asbestos or other fragile parts of the roof.
- Power tools requiring a two handed operation, such as circular saws or chain saws, should not be used by persons standing on a ladder.
- Persons operating such power tools from the roof area should be provided with a designed harness and anchorage system. When using a harness system, ensure employees are not working in isolation and that prompt emergency rescue procedures are implemented.
- Undertaking light duty tasks, such as cleaning gutters, from a secured ladder.
- Use of roof ladders on very steep pitched roofs should be used in conjunction with a fall arrest device.
- Any ladder used to access the roof should be of robust design and construction and set up in a safe manner. It should be set up on a surface that is solid and stable, and set up to prevent the ladder from slipping. Slipping of ladders can be prevented by placing single and extension ladders at a slope of 4 to 1, and setting up stepladders in the fully opened position. Single and extension ladders should be secured at both the top and bottom.
- Check/confirm that the roof is structurally sound and can hold the weight of workers and equipment.
- Skylights should be clearly identified, visible and have a mesh installed underneath to eliminate the chance of falling through.
- Make sure that anyone working on the roof is wearing suitable non-slip footwear.
- Do not work in bad weather, or in conditions of excessive glare.
- Take additional precautions if the roof work is in close proximity to any electrical sources. For example, people should not handle or use ladders where it is possible for the person or the ladder to make contact with powerlines. Metal or metal reinforced ladders should not be used when working on live electrical installations.
- Make sure the roof area is kept clear of any debris, materials and equipment.
- Always comply with the Code of Practice for Working on Roofs Part1 (Commercial and Industrial)



WorkCover: Watching out for you.



# Helping NSW Plumbing Contractors stay ahead of the game

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The Master Plumbers Association of NSW is the lead organisation in an overarching plumbing industry co-operative of specialist organisations established to assist, service and protect the NSW plumbing industry.

This co-operative also includes

- **Master Plumbers Apprentices Limited (MPAL)** a nationally registered Group Training Organisation specialising in the employment of plumbing apprentices,
- **MPA Training (RTO 91087)** and in the near future the
- **Master Plumbers College of Excellence** (a plumbing industry Skills Centre)



## Sustainable Plumbing Practices

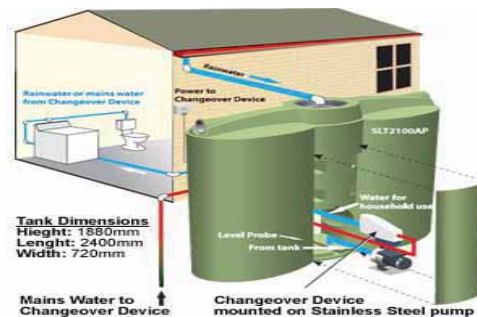
**Sustainable Plumbing Practices** is an accredited course through the auspices of the NSW Vocational Education Training Advisory Board.

A joint initiative of the Master Plumbers Association of NSW, the NSW Department of Energy and Conservation and the NSW Department of Energy Utilities and Sustainability (now - the NSW Department of Energy and Water and the NSW Department of Environment and Climate Change).

This course recognises that plumbers spend six years in training developing their skills to become a professional plumber.

This course does not teach a plumber how to do plumbing, it utilises these skills and the plumber's practical technique and knowledge. This course will update plumbers on the regulations, legislative requirements, techniques, products and work practices to effectively complete the following:-

- **Water Conservation** - rainwater tanks, recycled water, bore water, regulation and government incentives
- **Energy Efficiency** - solar hot water systems, gas systems, regulation and government incentives
- **Waste Water Management** - grey water dispersion, grey water treatment, black water, regulation and management
- **Stormwater Management** - stormwater management, detention tanks regulation and management
- **Business Practices and Marketing** - OH&S, environmental plumbing audit, commercial risk and contracts



# Call 8789 7000

**Coming soon** An introduction to Sustainable Plumbing for Apprentices.

This free online course will give apprentice plumbers an introduction to sustainable plumbing that is not covered in the Certificate III in Plumbing course.