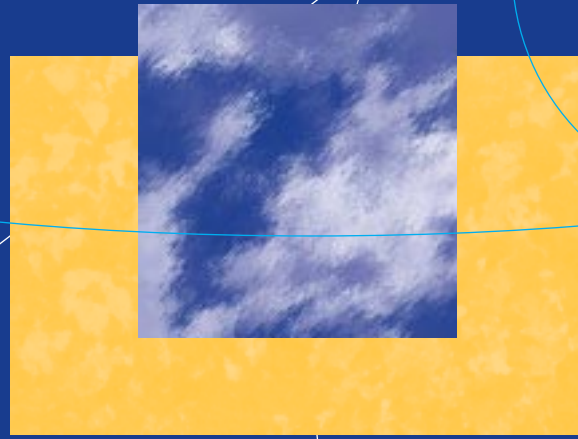




Government of  
Western Australia



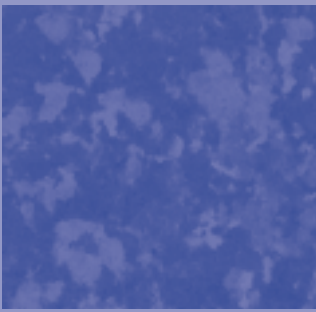
**CODE OF PRACTICE**

**A B R A S I V E  
B L A S T I N G**

JUNE 2000



**WorkSafe  
Western  
Australia  
COMMISSION**



## Foreword

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The *Occupational Safety and Health Act 1984* established the WorkSafe Western Australia Commission which comprises representatives of employers, unions, government and experts. The Commission has the function of developing the legislation and any supporting guidance material and making recommendations to the Minister for implementation. To fulfil its functions the Commission is empowered to establish advisory committees, hold public enquiries and publish and disseminate information.

The Commission's objective is to promote comprehensive and practical preventive strategies that improve the working environment of Western Australians.

## The Act

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The *Occupational Safety and Health Act 1984* provides for the promotion, co-ordination, administration and enforcement of occupational safety and health in Western Australia.

With the objective of preventing occupational injuries and diseases, the Act places certain duties on employers, employees, self-employed persons, manufacturers, designers, importers and suppliers.

In addition to the broad duties established by the Act, it is supported by a further tier of statute, commonly referred to as regulations, together with lower tiers of non-statutory codes of practice and guidance notes.

## Regulations

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Regulations have the effect of spelling out the specific requirements of the legislation.

Regulations may prescribe minimum standards. They may have a general application or they may define specific requirements related to a particular hazard or a particular type of work.

Regulations may also be for the licensing or granting of approvals, certificates, etc.

## Codes of Practice

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A Code of Practice is defined in the Act as a document prepared for the purpose of providing practical guidance on acceptable ways of achieving compliance with statutory duties and regulatory requirements.

Codes of practice:

- should be followed, unless there is another solution which achieves the same or better result; and
- can be used to support prosecution for non-compliance.

## Guidance Notes

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A guidance note is an explanatory document issued by the Commission providing detailed information on the requirements of legislation, regulations, standards, codes of practice or matters relating to occupational safety and health.



**WorkSafe  
Western  
Australia  
COMMISSION**

*Occupational Safety and Health Act 1984 and  
Occupational Safety and Health Regulations 1996*

**CODE OF PRACTICE**

**A B R A S I V E**

**B L A S T I N G**

J U N E 2 0 0 0



# Authority

This Code of Practice is approved by the Minister for Labour Relations pursuant to Section 57 of the *Occupational Safety and Health Act 1984*.

# Scope

This Code of Practice applies to all workplaces in Western Australia covered by the *Occupational Safety and Health Act 1984* where abrasive blasting is carried out.

# Who should use this code of practice?

This Code of Practice should be used by all persons involved in any aspect of abrasive blasting, including employers, contractors, employees, safety and health representatives, designers, manufacturers and suppliers of plant, and suppliers of materials used in abrasive blasting.

# Other legislation

The *Environmental Protection Act 1986* and *Regulations* require registration of abrasive blasting operations.

For further information on this Code of Practice, contact the Chamber of Commerce and Industry of Western Australia (Tel. 9365 7577), UnionsWA (Tel. 9328 7877) or WorkSafe Western Australia (Tel. 9327 8777).

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# 1. Abrasive Blasting

## 1.1 Purpose

This Code of Practice provides practical advice on meeting the requirements of the *Occupational Safety and Health Act 1984* and the *Occupational Safety and Health Regulations 1996* as they relate to abrasive blasting.

It applies to:

- all workplaces where abrasive blasting is being carried out;
- all persons who may be exposed to hazards arising from abrasive blasting in workplaces;
- workplaces where:
  - abrasive blasting products are used;
  - processes associated with abrasive blasting are undertaken; and
  - abrasive blasting products and equipment are stored.

## 1.2 Abrasive Blasting

Abrasive blasting is used for cleaning surfaces such as steel, bricks, cement and concrete, usually to remove scale, rust, old paint or other matter before applying a protective coating. Abrasive blasting can also be used to remove graffiti.

Abrasive blasting procedures can vary widely. They can be performed in closed environments like blasting chambers or cabinets, or on open sites such as buildings, bridges, tanks, boats or mobile plant.

Abrasive blasting involves using a stream of abrasive material, propelled at high speed by compressed air, water, steam, centrifugal wheels or paddles against a surface, to clean, abrade, etch or otherwise change the original appearance or condition of the surface. It includes high pressure water and steam blasting incorporating abrasive material.

## 1.3 Occupational Safety and Health Act and Regulations

The *Occupational Safety and Health Act 1984* places primary responsibility for the safety and health of people doing abrasive blasting upon employers.

Employers must:

- provide a workplace where employees are not exposed to hazards;
- provide a safe system of work; and
- consult with their employees on matters of safety and health.

See Appendix 1:  
General Principles  
for Managing  
Occupational  
Safety and Health  
in Workplaces

The Act also sets out duties for other people at the workplace. Employees must:

- take reasonable care for their own safety and health and that of others affected by their work; and
- co-operate with their employer in regard to matters of safety and health.

Employers and self-employed persons must, as far as is practicable, look after their own safety and health and ensure their work does not affect the safety of others.

Designers, manufacturers, importers and suppliers must provide plant that is safe to install, maintain and use at workplaces. Suppliers of hazardous substances must provide sufficient information about the substances they supply to enable them to be used safely at the workplace. Designers and those who construct buildings for use as a workplace have a duty to ensure that persons who use them are not exposed to hazards.

More information on the general principles and legislative framework for managing occupational safety and health in Western Australia is provided in Appendix 1 of this code of practice.

While the *Occupational Safety and Health Regulations* include some regulations that relate specifically to abrasive blasting (Regs 3.102 - 3.107), the regulations that apply are not limited to these particular regulations. Persons involved in abrasive blasting need to be aware of other regulations in *PART 3 WORKPLACE SAFETY REQUIREMENTS*, particularly those relating to atmospheric contaminants and respiratory protection (Regs 3.37 - 3.44); the regulations in *PART 4 PLANT* and *PART 5 HAZARDOUS SUBSTANCES* which are relevant to their workplace. They should also check whether a certificate of competency is required to operate any of the industrial equipment at their workplace (PART 6).

## 1.4 Environmental Protection Act 1986 and Regulations

The *Environmental Protection Act 1986* and the *Environmental Protection (Abrasive Blasting) Regulations 1998* are relevant to the abrasive blasting operations covered in this code of practice. For information on the application of the environmental protection legislation relating to abrasive blasting contact the Department of Environmental Protection [Tel.: (08) 9222 7000].

See Appendix 2 for regulations which apply specifically to abrasive blasting.

## 2. Hazards

See Appendix 2  
Regulation 3.1

### 2.1 Hazard identification and risk assessment

While some of the hazards associated with abrasive blasting are widely known and recognised, the *Occupational Safety and Health Regulations 1996* outline three steps to be followed in workplaces:

- hazard identification – identifying situations where employees and visitors may be exposed to injury or harm;
- risk assessment – working out which parts of the process or activity are more likely to cause injury or harm, and how serious the injuries or harm might be; and
- risk reduction – taking action to prevent the injury or harm.

The responsibility for completing the three steps rests with the person who is the employer, main contractor, a self-employed person or the person with control over the workplace or access to it. Known hazards include hazardous substances, dusts and hazards associated with plant and equipment.

The abrasive blasting process itself is a hazardous operation. As the operator or blaster is directing a stream of abrasive material by a nozzle on the end of a long length of heavy, reinforced flexible hose, there is a danger that the operator may accidentally direct the shot at himself or herself, thereby causing an injury. As well as the danger from the abrasive material, there are other hazards such as static electricity, working in a confined space and manual handling that need to be controlled or eliminated.

### 2.2 Substances

#### 2.2.1 Substances that can be used for abrasive blasting

Table 1: Substances that can be used for abrasive blasting.

SUBSTANCES THAT CAN BE USED	
Copper slag	Metal grit
Aluminium oxide	Plastic beads
Zinc slag	Sodium bicarbonate
Metal shot	Nickel slag
Garnet	

This list of substances that can be used is not exhaustive. There may be other substances that could be used provided a risk assessment carried out prior to use determines it is safe to do so.

Table 1

## 2.2.2 Substances that cannot be used for abrasive blasting

The substances listed in Table 2 may not, under Regulation 3.107, 5.14 and Schedule 5.2 of the *Occupational Safety and Health Regulations 1996*, be used as abrasive material in an abrasive blasting process.

### PROHIBITED SUBSTANCES

- Any substance that consists of or contains 2% or more dry weight of crystalline silicon dioxide as a contaminant. This includes:
  - river sand;
  - beach sand or any white sand;
  - pool filter material (diatomaceous earth); and
  - dust from quartz rock.
- Any substance that contains more than:
  - 0.1% antimony;
  - 0.1% arsenic;
  - 0.1% beryllium;
  - 0.1% cadmium;
  - 0.5% chromium;
  - 0.5% cobalt;
  - 0.1% lead;
  - 0.5% nickel; or
  - 1.0% tin.
- Any substance containing a radioactive substance.
- Any substance used in wet abrasive blasting containing:
  - chromate;
  - nitrate; or
  - nitrite.
- Any recycled material that has not been treated to remove respirable dust.
- Any substance capable of causing harm to the upper respiratory tract of a person.

Table 2

## 2.3 Atmospheric Contaminants

Atmospheric contaminants are a major hazard in abrasive blasting.

The prime hazard in abrasive blasting is dust, in particular silica dust. Prolonged inhalation of crystalline silica dust can cause silicosis. Particles of other materials may also be present in the dust to which the employee is exposed. The nature of these materials will depend on the material being abraded. Sometimes heavy concentrations of iron oxide are produced during the cleaning of iron castings. Toxic dusts may constitute a significant hazard when cleaning toxic metals such as lead, or when removing surface coatings containing lead, mercury, arsenic, zinc and cadmium.

See Appendix 2  
Regulation 3.40,  
3.41, 3.42, 3.43  
and 3.44 AS/NZS  
1715 AS/NZS  
1716

Employers must ensure their employees are provided with appropriate respiratory protective equipment to ensure they are protected against atmospheres containing substances which may be harmful if breathed.

Section 3 of this code of practice provides detailed information on the selection and use of respiratory protection to ensure employees are not exposed to an oxygen deficient or toxic atmosphere.

Section 3 also covers the quality of air to be supplied when using a supplied air respirator. In this code, this air is referred to as *breathable air*.

### 2.3.1 Dust

#### (i) Risk factors

There are four risk factors with dust. These are:

- the type of particulate involved and its biological effect;
- the concentration of airborne particulate in the breathing zone of the worker;
- the size of the particles present in the breathing zone; and
- the duration of exposure.

#### (ii) Categories of dust

There are two categories of dust generated by abrasive blasting:

- Inspirable dust – dust which a worker can inhale from the air in the work area. It can contain a wide range of particles of different sizes including particles which are too heavy to be inhaled and captured by the respiratory system to very small particles of respirable size.
- Respirable dust – that portion of inspirable dust consisting of very small particles of dust which can easily penetrate the lung down to the lower bronchioles and alveolar regions. Abrasive blasting produces high levels of respirable dust.

## 2.3.2 Silica dust

Silica dust is a major hazard in abrasive blasting. It is generated:

- when a blasting medium containing silica is used; or
- when blasting concrete or masonry surfaces.

A substance that contains crystalline silica is prohibited as a blasting medium, except where the medium contains less than 2% silica as a contaminant.

See Appendix 2  
Schedule 5.2

### (i) Health effects

The major risk from silica dust is silicosis. Silicosis is a chronic disease which causes stiffening and scarring of the lung. Symptoms usually take a number of years to appear. They include shortness of breath, coughing and chest pain. This leads to a degeneration in the person's health.

The risk of disease is directly related to the amount of dust inhaled. There is some evidence that people with silicosis have an increased risk of developing lung cancer.

### (ii) Hazard identification

The hazard identification and risk assessment procedures outlined in section 2.1 should determine whether silica dust is likely to be generated by the abrasive blasting.

### (iii) Control measures

Measures to control silica dust generated by abrasive blasting include using a blasting medium which does not contain silica, and ensuring the process is isolated or appropriate administrative strategies are implemented.

Blasting of concrete and masonry will produce silica dust. If high levels of silica exist in the substrate being blasted, silica dust will be produced irrespective of the blasting material used. In these situations, operators must wear personal protective equipment and wet abrasive blasting techniques must be used.

### ● Isolation

Isolating the process where silica dust is produced may be achieved by:

- blasting in a blast chamber;
- enclosing an area with plastic or other forms of impervious protective sheeting to limit the movement of dust from the source where blasting in a blast chamber is not practicable; or
- setting up designated exclusion zones. The exclusion zone can be established by:
  - installing physical barriers and warning signs to prevent unprotected persons from entering the area;
  - shrouding the area where blasting is to occur; and

- restricting entry of unprotected persons into the abrasive blasting area whilst blasting occurs.

If isolation is by means of an exclusion zone, signs must be posted at least 25 metres from the perimeter of the exclusion zone of the abrasive blasting site, to warn workers and others that:

- abrasive blasting is in progress;
- access to the work area is restricted to authorised persons; and
  - respiratory protection must be worn in the work area.

Particular care must be taken in the clean up process. Concrete and masonry dust must be cleaned and collected in an appropriate manner to ensure the level of silica dust does not exceed the exposure standard. Methods of cleaning include the wetting down of dust prior to clean-up.

If silica dust is present or is likely to be present, a warning sign to this effect must also be posted.

See Appendix 2  
Regulation 3.11

Warning signs must be in accordance with *AS 1319 Safety signs for the occupational environment*. *AS 1319* sets out requirements for the design and use of safety signs intended for use in the occupational environment to regulate and control safety related behaviour, to warn of hazards and to provide emergency information.

The speed and direction of any wind at the workplace should be considered and may require extending the exclusion zone down-wind.

The *Environmental Protection Act* controls the discharge of wastes into the environment. Abrasive blasting which has the potential to impact on the environment is subject to the registration requirements of the Department of Environmental Protection.

#### ● Administrative controls

Exposure to silica dust can also be controlled by implementing administrative controls such as:

- adjusting work schedules to limit the time any one operator is required to operate a blast nozzle; and
- giving consideration, prior to commencing the process, to ways of containing dust and removing waste from the abrasive blasting process.

#### (iv) Review of control measures

Where there is a silica hazard the control measures should be monitored. Monitoring should be conducted:

- outside the blast chamber;
- when using a dry blasting technique; or
- where it has not been practicable to establish an exclusion zone of 25 metres.

To ensure that workers and others are not exposed to levels of silica in excess of the exposure standard where abrasive blasting is performed, monitoring should be conducted by a competent person:

- where the amount of free silica released from abraded material such as masonry or concrete will be greatest, eg. down-wind of the blast site; and
- in accordance with *AS 2985 Workplace atmospheres – Method for sampling and gravimetric determination of respirable dust*.

If monitoring identifies the control measures are not adequate to prevent workers and others being exposed to levels of silica above the exposure standard, abrasive blasting must cease.

The abrasive blasting should not re-commence until:

- different work methods have been developed to ensure workers and others are not exposed to high levels of silica dust;
- workers are provided with appropriate personal protective equipment; and
- effective clean-up of the contaminated area occurs to minimise silica dust.

## 2.4 Particulate matter

Workers carrying out abrasive blasting can be struck by particulate matter. Particulate matter is small particles or pieces of the substrate or blasting medium which are generated during abrasive blasting. Particulate matter can include water.

### (i) Potential effects

Serious injuries can occur if the blasting medium is discharged under high pressure and substrate matter is projected at high speed towards a person. Potential injuries include:

- eye damage;
- severe lacerations;
- burns; and
- skin penetration.

A blast nozzle must never be pointed at a person.

### (ii) Hazard identification and risk assessment

The hazard identification and risk assessment process outlined in section 2.1 should identify the source of the particulate matter, the level of particulate matter and evaluate the risk to exposed workers.

### (iii) Control measures

Measures to control the risks from particulate matter include:

- carrying out the abrasive blasting in a blasting enclosure or an area isolated from the workplace to reduce the possibility of employees and others being struck by particulate matter;
- installing guards to reduce the possibility of particulate matter striking the operator; and
- ensuring, where practicable, that only one worker operates each blast nozzle.

Workers exposed to particulate matter must be provided with personal protective equipment and they must use the personal protective equipment provided. Personal protective equipment includes:

- eye protection – safety glasses, goggles, face shields, hoods or helmets with lenses designed to withstand medium to high velocity impact by flying objects;
- hand protection – industrial safety gloves or mittens of an appropriate material to reduce penetration of particulate matter;
- foot protection – footwear made of material which reduces penetration from particulate matter, and where appropriate, is waterproof; and
- protective clothing such as protective suits, leather coveralls, overalls, long sleeved shirts and long trousers.

### (iv) Review of control measures

There should be ongoing monitoring of the abrasive blasting process to ensure that control measures are being followed and to assess the need for change and further training or retraining.

## 2.5 Plant and equipment

### 2.5.1 Plant under pressure

Abrasive blasting requires certain plant to be operated under pressure. Primarily these are air receivers and blasting hoppers. The responsibilities of the employer in relation to this type of plant include:

- ensuring any air receiver or blasting hopper used at his or her workplace is of a design registered under Part 4 of the *Occupational Safety and Health Regulations 1996*;
- in-service inspections are carried out in accordance with the manufacturers' specifications or *AS/NZ 3788 Pressure equipment – In-service inspection*;
- pressure vessels are operated only by persons trained in their use;
- all fittings are of equivalent rating to the pressure vessel and are correctly attached;
- blow-down procedures are developed and implemented;

- where air supply is from a local air compressor an electrical cut-off control is fitted and regularly checked; and
- a safety relief valve is fitted and regularly checked.

Employers and employees must ensure all necessary steps are taken to reduce the potential risk from particulate matter.

### 2.5.2 Blast nozzle

The equipment used for abrasive blasting should be designed so that the person operating the nozzle can control the flow of abrasive material through the nozzle. Procedures or a mechanism should be in place to stop the flow of abrasive material in an emergency. Two-person operations can be used if activating devices are not practicable.

See Appendix 2  
Regulation 3.103

The blast nozzle is a key piece of equipment in abrasive blasting. It may be fitted with an automatic cut-off device or tap type (ball valve) or electronic toggle switch. This is particularly important if the operator accidentally drops or loses control of the blast nozzle.

An automatic cut-off device, sometimes known as a *deadman control*, must be used and maintained in accordance with the manufacturer's instructions. The controls must not be disabled or removed to allow continuous function. This is especially important where abrasive blasting is being conducted:

- in a confined space;
- where the persons performing the work are working above ground level and there is risk of falling; or
- where the operator may be temporarily out of sight of an observer.

Abrasive blasting equipment must have:

- an efficient means of discharging static electricity from the blast nozzle when dry blasting; and
- sufficient water flow to prevent dust when wet blasting.

### 2.5.3 Hoses

All hoses used for abrasive blasting should be specifically designed for the purpose of abrasive blasting.

Abrasive blasting hoses should be:

- made of impregnated carbon to prevent electric shock or fitted with an earth wire or similar earthing system if they are made of any other material;
- fitted with hose whip checks or hose coupling safety locks or both;

- kept as straight as possible. Long gradual curves should be used where hoses have to negotiate objects or equipment. Sharp curves may cause rapid wear on the hose resulting in damage and possibly malfunction; and
- positioned in locations where they are not subjected to damage, fouling or restrictions such as from vehicles, buildings or fences.

#### 2.5.4 Blast chambers

The *Environmental Protection (Abrasive Blasting) Regulations 1998* require abrasive blasting to be carried out in a blasting chamber unless such a chamber cannot reasonably be used because of the size, shape, position or location of the object being blasted.

The *Occupational Safety and Health Regulations 1996* require:

- **a blast chamber or blasting cabinet:**
  - to be constructed of hard wearing non-combustible material;
  - to be designed and maintained to prevent the escape of dust and minimise internal projections where dust may settle;
  - to have windows or inspection ports which are:
    - fixed in a metal sash;
    - maintained to allow effective visibility; and
    - constructed of toughened safety glass, laminated safety glass; or safety wired glass.
- **blasting chambers to have:**
  - an electrical supply to a hazardous area designed, manufactured and installed in accordance with AS 3000 Electrical installations (known as the SAA Wiring Rules);
  - a minimum illumination of 200 lux, measured on a horizontal plane situated one metre above the floor;
  - two exits, a primary entrance and emergency exit, both fitted with a quick release system. The emergency exit must be appropriately sign posted and positioned at the furthest point from the main entrance; and
  - an efficient mechanical ventilation system.

The ventilation system must:

- be constructed and maintained so that air is passed through a filtering or cleaning device that removes airborne contaminants before discharge;
- have:
  - a minimum air flow of 0.3 linear metres per second in the case of a blast chamber with a down-draft air flow; or
  - a minimum air flow of 0.4 linear metres per second, in the direction of extraction, when a cross-draft air flow blasting chamber is used.

See Appendix 2  
Regulation 3.103

Contact  
Department of  
Environmental  
Protection for  
further  
information  
See 1.4

See Appendix 2  
Regulations 3.8,  
3.104 and 3.105

## 2.6 Wet Abrasive blasting

Wet abrasive blasting means abrasive blasting where water is added to the abrasive material or its propellant or is used as a propellant. Whilst the addition of water should reduce or minimise the risk of exposure to dust, other hazards associated with abrasive blasting will remain and have to be controlled.

The same processes and procedures that apply to dry blasting apply to wet abrasive blasting.

While a distinction can be drawn between wet abrasive blasting and the use of water at high pressure or water jetting of material to prepare surfaces, similar requirements relate to the plant used in both processes.

The three step hazard identification and risk assessment process outlined in section 2.1 must be followed before work commences and because of the high pressures used, measures should be taken to ensure the safety and health of all persons, whether operating the equipment or in the vicinity, are protected.

Only high pressure hoses, firmly secured, should be used and:

- all bypass valves should be equipped with pressure safety relief valves;
- a funnel should be fitted near the end of the nozzle to minimise the risk of the water stream hitting the operator; and
- an automatic cut-off device (*deadman control*) should be fitted to the nozzle. This device should be capable of being activated when the start switch is released if, for example, the operator accidentally drops or loses control of the nozzle.

This is particularly important if the equipment is being used:

- in a confined space;
- above ground level; or
- where the wet blasting operator may be temporarily out of sight of an observer.

A *deadman control* should only be used according to the manufacturer's instructions and not disabled or removed to allow continuous function.

If the nozzle is not fitted with a *deadman control* the employer must ensure procedures are in place that will allow a person other than the person operating the nozzle to cut off the flow if the person operating the nozzle is unable to do so.

All hoses or lines should be positioned in locations where they are not subjected to damage, fouling or restrictions such as from vehicles, buildings or fences.

See Appendix 2  
Regulation 3.103

Personal protective equipment to be used when operating water blasting or water jetting plant includes protection for the:

- head;
- eyes;
- body;
- hands;
- feet;
- ears; and
- respiratory system.

Rust inhibitors containing chromate, nitrate or nitrite are not to be used when wet blasting.

## 2.7 Noise

### (i) Potential effects

Hearing loss is a major risk when abrasive blasting. Excessive noise can affect the ear's ability to hear. Effects may range from temporary loss of hearing, deafness from prolonged exposure and tinnitus (ringing in the ear).

Prolonged exposure leads to the destruction of hair cells in the ear. The effects of prolonged exposure are irreversible, however, the effects can be halted if preventative measures are taken.

Damage to hearing depends on how loud the noise is and the length of exposure.

Workers may be exposed to high noise levels that originate from the:

- abrasive discharge nozzle;
- impact of abrasive on the substrate;
- dust exhaust systems;
- air inlet of the breathing helmet;
- air compressor; or
- air in the helmet.

### (ii) Hazard identification and risk assessment

The hazard identification process and risk assessment should identify the source of the noise, the noise level and risk to exposed workers.

### (iii) Control measures

Measures to control risks from exposure to noise are outlined in the *National Code of Practice for Noise Management and Protection of Hearing at Work [NOHSC: 2009 (1993)]*. This code is being revised and is expected to be republished in 2000. These measures include:

- replacing the abrasive blasting process with a safer method;
- isolating the abrasive blasting from other persons at the workplace by:
  - using blasting chambers;
  - shifting blasting away from other workers;
  - undertaking abrasive blasting out of normal working hours; or
  - stopping other work and clearing people from the area during blasting;
- reducing the noise generated by plant during abrasive blasting by:
- suitable soundproofing surrounding the plant;
- lowering the pressures produced; and
- maintenance of filters and silencers of the air supply;
- establishing exclusion zones where noise levels exceed the exposure standard.

Monitoring should be done to ensure workers are not exposed to levels above the exposure standard.

Areas with high noise exposure levels should be identified by signs and entry restricted to persons wearing adequate hearing protection. Signs should be in accordance with *AS 1319 Safety signs for the occupational environment*.

Hearing protection should be worn to reduce the risk of noise exposure to workers and others. When selecting hearing protectors the following should be considered:

- type of working environment;
- comfort, weight and clamping force;
- combination with other items of personal protective equipment;
- safety of the wearer;
- opportunity for personal choice; and
- hygiene aspects.

Further information is provided in the *National Code of Practice for Noise Management and Protection of Hearing at Work [NOHSC: 2009 (1993)]*.

### (iv) Review of control measures

Monitoring should be carried out to ensure that systems of work have eliminated or reduced the levels of noise consistent with the exposure standard.

The monitoring should be:

- conducted by a competent person;
- in accordance with AS 1269 Occupational noise management; and
- at random intervals during the abrasive blasting process.

See Appendix 2  
Regulation 3.45

See Appendix 2  
Regulations 3.32  
and 3.46

See Appendix 2  
Regulation 3.11

See Appendix 2  
Regulation 3.47

Where workers are exposed to noise levels in excess of the exposure standard the abrasive blasting should cease. Work should not re-commence until:

- different work methods or equipment modifications have been developed to reduce workers' exposure to below the exposure standard; or
- workers have been provided with personal protective equipment that will reduce their exposure to below the exposure standard.

## 2.8 Lead

Lead is a hazardous substance. Lead is easily taken into the body by breathing or swallowing dust or fumes. The rate of absorption depends on the size of the particles. Abrasive blasting will produce particles small enough to be rapidly absorbed, leading to more acute and severe toxic effects.

Lead dust may be generated by blasting surfaces containing lead or surfaces covered with paint containing lead. These surfaces commonly occur on bridges, ships and vehicles.

See Appendix 2  
Regulation 5.60

Any substance that contains more than 0.1% lead is prohibited as an abrasive in abrasive blasting.

### (i) Potential effects

The major risk associated with lead is plumbism (lead poisoning). This affects the blood system and can cause anaemia. Other symptoms include abdominal pain, convulsions, hallucinations, coma, weakness and tremors.

See Appendix 2  
Schedule 5.2

### (ii) Hazard identification and risk assessment

The hazard identification process should identify the source of lead dust or fume. Where there is the possibility that a substrate being blasted may contain lead, a risk assessment must be carried out to:

- assess the level of lead in the dust or fume;
- evaluate the risk to exposed workers; and
- evaluate the atmospheric lead level as a result of the blasting process.

### (iii) Control measures

Measures to control the risks associated with lead from abrasive blasting should be in accordance with the *National Code of Practice for the Control and Safe Use of Inorganic Lead at Work [NOHSC: 2015(1994)]* including:

- using a less hazardous method;
- separation of the area being blasted from other workers and the public, by using:
  - a blasting chamber;
  - a blasting cabinet; or
  - an exclusion zone.

Blasting chambers should be constructed of impervious material to prevent the escape of dust containing lead. Shade cloth will not prevent dust escaping.

An exclusion zone, as in the case of silica dust, should be established and warning signs complying with *AS 1319* displayed 25 metres from the perimeter of the zone. Where an exclusion zone exists, the employer must ensure operators are in the line of sight of an observer or have adequate means of communication (eg. flashing lights, audible alarm).

Scheduling work to reduce the number of people and the time they are exposed to lead dust by:

- undertaking blasting outside normal working hours;
- stopping other work and clearing people from the site while the blasting is taking place; or
- job rotation;
- maintaining high standards of personal hygiene.

As lead may enter the body through swallowing, care should be taken with personal hygiene. Amenities must be available so that employees can:

- shower immediately after abrasive blasting;
- change clothing after abrasive blasting. Clothing should be laundered regularly, preferably at the workplace or by a specialist laundry service;
- if disposable clothing is worn, follow procedures which ensure the clothing is appropriately disposed of without risk to the safety and health of others;
- wash their hands and face before eating, drinking or smoking after abrasive blasting; and
- eat or drink away from the blast site; and
- using personal protective equipment.

Personal protective equipment must be provided by the employer. The personal protective equipment must be properly fitted and used accordingly. Requirements of personal protective equipment are the same as for silica dust. They include:

- airline respirator of the hood or helmet type complying with *AS/NZS 1716 Respiratory protective devices*;
- shoulder cape, jacket or protective suit; and
- the quality of air to be breathed must be in accordance with Regulation 3.44.

See Appendix 2  
Regulation 5.61

See Appendix 2  
Regulations 3.40  
and 3.44

## 2.9 Asbestos

Significant health risks may arise from the inhalation of airborne asbestos fibres and the passage of these fibres into the lungs. Respirable fibres (ie. fibres less than 3 microns in diameter) are able to penetrate deep into the lungs and can be deposited there.

Employers have a duty to ensure the presence and location of any asbestos at the workplace is identified.

Asbestos has been used in more than 3000 products including sheets, pipes, filters, gaskets, floor tiles, roofing materials and paints. Identification may be difficult due to the location of the asbestos, such as in roof spaces, concealed gaskets, or paint or coatings obscuring it.

Abrasive blasting and high pressure water blasting of asbestos or asbestos products including cement building materials is prohibited.

See Appendix 2  
Regulation 5.14  
and 5.51 and  
Schedule 5.2

### (i) Potential effects

The major risk associated with asbestos exposure is to the respiratory system resulting in reduction in lung capacity, scarring of lung tissue, lung cancer or mesothelioma. Diseases such as lung cancer and mesothelioma take many years to develop and are invariably fatal.

### (ii) Hazard identification and risk assessment

The risks arising from hazards in relation to asbestos at the workplace must be assessed and controlled in accordance with the *Guide to the Control of Asbestos Hazards in Buildings and Structures [NOHSC: 3002(1988)]*.

An employer should be aware of the presence of asbestos products within the workplace and must inform his or her employees or any contractors of the presence of asbestos prior to the commencement of any abrasive blasting operations to ensure asbestos is not abraded. Manufacturers of articles or designers of buildings may be able to provide information.

The hazard identification process should identify the presence of asbestos. Where there is the possibility that a substrate being blasted may contain asbestos, blasting must cease and a risk assessment carried out to:

- determine the potential for asbestos to be disturbed; and
- evaluate the risk to exposed workers.

See Appendix 2  
Regulation 5.43

### (iii) Control measures

Where the presence of asbestos has been identified the employer must determine whether or not abrasive blasting should proceed. Abrasive blasting must not be carried out if it will disturb the asbestos. The asbestos must be removed before abrasive blasting commences. The removal of thermal or acoustic insulation can only be carried out by a licensed asbestos removalist in accordance with the *Code of Practice for the Safe Removal of Asbestos [NOHSC: 2002(1988)]*.

Where asbestos is encapsulated appropriate steps should be taken to ensure subsequent abrasive blasting of any surface does not damage the encapsulated asbestos. Where asbestos removal occurs the employer must ensure the site is clear of any asbestos prior to the commencement of abrasive blasting.

High pressure water blasting of asbestos products and asbestos cement building products is prohibited.

Asbestos cement building materials must be removed or handled in accordance with the *Code of Practice for the Safe Removal of Asbestos [NOHSC: 2002(1988)]*.

See Appendix 2  
Regulation 5.50  
and Schedule 5.2

## 2.10 Working in a confined space

Abrasive blasting in a confined space should only be undertaken when it is not possible to avoid doing the work in that space. A safe system of work should be developed and implemented, and access limited to personnel needing to work in the confined space.

### (i) Hazards

Hazards that may be encountered in a confined space include but are not limited to:

- chemical agents such as combustible gases or vapours, toxic gases or vapours, combustible or toxic liquids or solids, or potentially explosive dusts;
- oxygen deficiency or excess; and
- physical agents such as thermal extremes, radiation, noise or flooding.

### (ii) Controls

The system of work should ensure:

- adequate illumination is provided to ensure visibility is sufficient to allow safe work to continue;
- where air-supplied respirators are required, the breathing air line to the respirator is protected from damage or restriction;
- escape equipment is provided and accessible; and
- there is a means by which the stand-by person or observer is able to cut off the flow of the material if the person operating the nozzle in the confined space becomes unable to operate or control the nozzle.

See Appendix 2  
Regulations 3.82  
and 3.85

Consideration must also be given to whether the circumstances require safety harnesses and lines to be used.

**(iii) Checklist for work in confined spaces**

*(a) Pre-entry*

Before entering a confined space, the following matters should be addressed:

- factors relevant to employee selection - eg. aptitude and fitness for task and confined space entry;
- action to be taken in respect of:
  - co-ordination, planning and supervision of work;
  - implementation of emergency rescue plans;
  - initiating safe work practices;
  - signposting work areas;
  - isolating confined spaces;
  - evaluating the confined space environment;
  - comparing initial test results with existing standards to determine ventilation and/or personal protection requirements;
  - ventilation and extraction system and/or personal protection;
  - limited vision through hood;
  - establishing a communication system;
  - ensuring rescue equipment is available and operative;
  - ensuring standby personnel are available for rescue and operation of essential equipment;
  - entry permits; and
  - when there might be a need to evacuate the confined space if conditions change;
- employee training in:
  - emergency entry and exit procedures (eg. rescue);
  - use of respiratory protective devices;
  - first aid;
  - lockout procedures;
  - communications; and
  - fire protection.

*(b) Entry and re-entry*

At the time of entry or re-entry, the following should be considered:

- a comparison of initial test results with an existing standard to determine whether ventilation or personal protective equipment will be used;
- continuous or periodic monitoring of confined space atmosphere;
- ensuring safe work practices are followed;
- re-issuing permits after absence from the area or if conditions change; and
- accountability for all persons and equipment.

*(c) After work has been completed*

- review the operation – consult with the employees who performed the work;
- check safe work systems were followed and identify any problems;

- secure the entry point to the confined space; and
- ensure all equipment is cleaned and stored away appropriately.

An entry permit should have a time limit. Another permit should be issued if work has not been completed within the time allowed. If this occurs the procedures outlined should be repeated.

*AS 2865 Safe working in a confined space* sets out the particular requirements and procedures for the safety of persons required to enter and work in a confined space and includes dealing with hazard identification and risk assessment, monitoring prior to entry, education and training, as well as rescue and first aid.

## 2.11 Manual Handling

There are many risks associated with manual handling in the abrasive blasting industry. The WorkSafe Western Australia Commission *Code of Practice for Manual Handling* should be referred to for further information.

As individual work areas or environments where abrasive blasting takes place may have some unique features, it may be difficult to assess all the risks. However, consideration should be given to the risk of:

- back strain from lifting or pushing;
- muscle strain from working in awkward postures; and
- strain from hose whip.

Information on manual handling problems could come from:

- an analysis of accident records;
- consultation with employees;
- direct observation or inspection of the task or work area; and
- the WorkSafe Western Australia Commission *Code of Practice for Manual Handling*.

The means of reducing or eliminating the risk of manual handling injuries include:

- appropriately designed plant and hoses tied to prevent hose whip;
- reducing the amount of force necessary to perform tasks, such as fixing wheels to heavy equipment, and moving heavy objects into and out of blasting chambers by using specially designed equipment; and
- ensuring workers do not have to perform manual handling tasks in excess of their capability.

The amount of time a worker is required to operate a blast nozzle in an awkward position can contribute to a manual handling risk. Consultation should take place to consider the most effective way of handling a task.

Training in correct lifting methods is also beneficial.

See Appendix 2  
Regulation 3.4

See Appendix 2  
Regulation 3.49

## 2.12 Falls

### (i) Hazard identification and risk assessment

Falling is a major risk at any time a worker is required to work above or below ground level. Where there is the risk of a person falling from, through or into a place or thing, the employer or the person in charge of the workplace must:

- identify any hazard that involves a person falling from one level to another while at the workplace or while using any means of access to and egress from the workplace;
- assess the risk of injury to a person resulting from each hazard identified; and
- consider the means by which the risk may be reduced.

### (ii) Controls

The employer, with the objective of reducing or eliminating the risk of falling, should:

- examine the need to work at heights or on an elevating work platform and whether the abrasive blasting can be carried out at ground level;
- inspect the work area and consult with employees; and
- ensure:
  - that safety signs are selected and displayed in accordance with AS1319;
  - elevating work platforms are fitted with operator controls, hand rails and fender (toe) boards; and
  - adequate lighting is available so that the operator can see:
- the physical limits of the work platform;
- any other persons in the work area;
- all control devices; and
  - an effective means of communication is established and maintained.

If the risk assessment so determines, the employer must provide appropriate personal protective equipment. The choice of fall-arrest systems and devices is important.

Consideration should be given to the:

- type of equipment required;
- training of employees in the selection, fitting, use, care, maintenance and storage of equipment; and
- training of employees in emergency evacuation procedures (eg. rescue).

For further information refer to the WorkSafe Western Australia Commission *Code of Practice for the Prevention of Falls at Workplaces*.

See Appendix 2  
Regulation 3.50  
and 3.57

## 2.13 Heat

Heat may be a problem with abrasive blasting. The type of personal protective equipment required to be worn, such as blast helmets, protective suits or leather coveralls, sometimes for long periods in hot conditions, contributes to this problem.

### (i) Health effects

Heat stress causes increased sweating, depletes body fluids and causes heat intolerance. This reduces work capacity and efficiency. Other signs of heat stress include tiredness, irritability, inattention and muscular cramps. It is important that people undertaking abrasive blasting are advised of the symptoms of heat stress.

Tasks requiring the use of heavy or impervious clothing need to be assessed individually as there is greater risk of heat stress. Likewise, people who are medically unfit, overweight, suffer from heart disease, or are not acclimatized, are at a greater risk of heat stress and require greater care when working in hot conditions.

### (ii) Controls

The employer, in consultation with safety and health representatives, if any, and employees should develop procedures for their workplace to ensure the effects of heat are minimised during abrasive blasting. The procedures should include work schedules, provision of personal protective equipment, amenities and first aid requirements.

The following should be considered as a means of reducing the risk of heat stress to abrasive blasting operators:

- provision of personal protective equipment that is appropriately selected and fitted to reduce build-up of heat. Cotton garments worn underneath may help in the reduction of heat build-up;
- cooling devices fitted to the air supply of blast helmets;
- scheduling work aimed at countering the build-up of heat inside personal protective equipment. This should include:
  - job rotation (where alternative tasks in cool areas are available);
  - appropriate breaks being provided to limit the time an operator works continuously, allowing the body to cool down; and
  - scheduling work in hours when ambient temperatures are cooler; and
- cool drinking water being readily available.

For further information on heat stress contact:

- The Chamber of Commerce and Industry of Western Australia (Tel. 9365 7555);
- UnionsWA (Tel. 9328 7877); or
- WorkSafe Western Australia (Tel. 9327 8777).

# 3. Personal Protective Equipment

See Appendix 2  
Regulations 3.32,  
3.34, 3.35, 3.36  
AS/NZS 1715  
AS/NZS 1716

## 3.1 Provision and selection of personal protective equipment

As it is not possible to totally avoid certain hazards in abrasive blasting, the employer must provide and where necessary replace, personal protective equipment to reduce as far as practicable the risk of injury or harm from these hazards. The selection of appropriate personal protective equipment requires consideration of the particular hazards such as those outlined in section 2 of this code.

## 3.2 Protection when doing abrasive blasting

Regulation 3.106 sets out the protection to be used when a person does abrasive blasting other than when the blasting is done in a blasting cabinet.

The person is:

- to be provided with a supplied air respirator which is fitted with an inner bib;
- to wear:
  - a shoulder cape, jacket or protective suit; and
  - a waist belt or body harness which is designed to bear the full drag of the trailing air hose or line, breathing tube, face piece or head covering. The waist belt should comply with *AS/NZS 1716 Respiratory protective devices*.

Where dust is visible during abrasive blasting, or during the clean-up, the pot attendant and any other person in the work area should wear appropriate respiratory protection equipment selected in accordance with this code.

Where an exclusion zone interferes with other activities at a workplace or project, other workers entering the exclusion zone must wear respiratory protective equipment.

## 3.3 Respiratory Protection

### 3.3.1 Respiratory protection program

A respiratory protection program is an integral part of a risk control procedure. A respiratory protection program should be established by management and a competent person placed in charge of the program. The person must have relevant training, qualifications, experience, knowledge and skills to run the program.

In a small company, especially where respirators may not often be used, the program may be directed by the company owner, manager, or a supervisor. The person who has responsibility for the program should have the full support of management.

A competent person means a person who has acquired through training, qualification or experience, or a combination of those things, the knowledge and skills to perform the task competently.

Providing a suitable respirator is only a small part of the employer's responsibility.

Standard operating procedures should be developed, based upon the following:

- identification of the hazards at the workplace to enable selection of the correct type of respirator;
- implementation of an employee training program covering instructions on how to use the equipment and the limitations of the equipment;
- selection and fit of the respirator;
- provision, if appropriate, of medical screening to determine whether employees assigned to wear respirators are physically or psychologically suited to doing so;
- so far as is practicable assigning respirators to employees for their exclusive use;
- regular cleaning and disinfecting of respirators;
- provision of proper storage facilities for respirators; and
- regular inspection and maintenance program for respirators.

### 3.3.2 Storage of equipment

Respiratory protective devices should be stored as close as practicable to the work area.

Respirators should be stored so that:

- they are kept clean and dry;
- they are away from oil, exposure to direct sunlight and corrosive atmospheres;
- they are protected from dust; and
- the face piece is not subject to distortion.

Filters should be stored in sealed containers bearing the date of the last inspection.

See Appendix 2  
Regulation 1.3

See Appendix 2  
Regulation 3.34

Respirators provided for emergency or rescue should be located where they are readily accessible. These should be checked regularly to ensure they are operating correctly.

A competent person should periodically evaluate the program to ensure that it is effective and functioning correctly. Where a person is required to wear a respiratory protective device, that person must be trained in the correct use, selection, fitting, storage, cleaning, maintenance and inspection of such equipment.

Further information relating to respiratory protection is available in:

- AS/NZS 1715 Selection, use and maintenance of respiratory protective devices;
- AS/NZS 1716 Respiratory protective devices; and
- the WorkSafe Western Australia Commission Code of Practice for Personal Protective Equipment.

Any equipment used to supply breathable air (eg. compressor, filters and respirators) must be maintained in efficient working order and in accordance with the manufacturer's instructions.

See Appendix 2  
Regulation 3.43

Fittings or connections must be such that they can only be used for equipment which supplies breathable air and not capable of being connected to other compressed air or gas equipment.

To maintain a constant rate of air flow from the compressor a receiver of sufficient capacity must be fitted to reduce pulsation.

To control the temperature of the air supplied, and to prevent overheating of equipment, a thermostatically controlled interlock system must be fitted.

Equipment should be stored correctly where it will not be exposed to contaminants, damage or the likelihood of deterioration.

Equipment must be inspected before and after use and during any cleaning.

Records must be kept with the following details noted:

- the date equipment was purchased;
- the date of any testing carried out;
- the name and contact address of the person who carried out the test; and
- the results of any tests carried out.

## 3.4 Breathable air

### 3.4.1 Air quality

Air breathed from airline respiratory equipment must be supplied at a regulated rate, with the prescribed oxygen content. The temperature of the air must be maintained within a range of 15 degrees Celsius to 25 degrees Celsius. The air must be filtered to ensure that there are no unpleasant or nauseous odours. Filters should be cleaned at least once in each day they are used.

To eliminate the likelihood of the operator inhaling moisture or condensed liquid an efficient condensate trap with a drain cock must be fitted to equipment supplying breathable air to eliminate the likelihood of the operator inhaling moisture or condensed liquid.

Air should be continually circulated to avoid it becoming stale. An efficient ring circuit or a method for “leaking off” air must be used to eliminate stale air.

Hoses used for the delivery of breathable air should be specifically designed for this purpose.

Equipment should be maintained in good condition and in an efficient and effective working order.

Where a person works in a toxic or oxygen deficient atmosphere a secondary or emergency air supply must be provided. A back up or secondary air supply must have an adequate automatic warning device which is activated if the primary air supply fails.

Specifications for air breathed from airline respiratory equipment are in Regulation 3.44.

### 3.4.2 Quality of plant air supply systems

Particular care must be taken to ensure plant air supply systems supply only compressed breathable air. An air supply containing other compressed gases must not be used under any circumstances.

A plant air supply system is a system where compressed air is reticulated around an installation or work area. The reticulated system may have a number of outlets which can be “tapped into” and used to supply compressed air to operate various items of plant or equipment, including breathable air.

Plant air supply systems are not suitable for air-line respirators unless special precautions have been taken for the elimination of scale, rust, water, oil, mist, irritating ingredients and unpleasant or nauseous odours. It is far preferable to have a separate air supply system designed to eliminate contaminants for respiratory air.

See Appendix 2  
Regulation 3.15,  
3.38, 3.39, 3.44

If respiratory equipment is connected to a general works plant breathable air system, the employer of the person using the respiratory equipment must:

- test the quality of the air prior to initial use and at regular intervals;
- ensure that back pressures from other items of plant using the air supply will not cause contamination of the air used for breathing; and
- ensure that air lines supplying the breathing apparatus receive an adequate supply of breathable air under all plant operating conditions, that is, a minimum of 170 litres per minute per person.

# Appendix 1: General Principles for Managing Occupational Safety and Health in the Workplaces

## 1.1 Legislative Framework in Western Australia

The Occupational Safety and Health Act 1984 sets objectives to promote and improve occupational safety and health standards. The Act sets out broad duties and is supported by more detailed requirements in the *Occupational Safety and Health Regulations 1996*. The legislation is further supported by guidance material such as approved codes of practice. This legislative framework is depicted below.



## 1.2 Access to Act, Regulations and Other Relevant Documents

Employers are required to provide information to employees, to alert them to areas where hazards may exist and to improve their understanding of safe work practices. Regulations specify documents which must be made available for perusal by employees at the workplace.

## 1.3 Hazard Identification, Risk Assessment and Risk Control

The occupational safety and health regulations outline three basic steps:

- **Identification of hazards**  
This involves recognising things which may cause injury or harm to the health of a person, for instance flammable material, ignition sources or unguarded machinery.
- **Assessing risk**  
This involves looking at the possibility of injury or harm occurring to a person if exposed to a hazard.
- **Controlling the risk of injury or harm**  
This involves introducing measures to eliminate or reduce the risk of a person being injured or harmed.

Those steps, especially if there are changes in the work environment, new technology is introduced, or standards are changed should be regularly reviewed.

Employers should consult with safety and health representatives, if any, and employees during these steps.

### 1.3.1 Identifying hazards

**A HAZARD MEANS ANYTHING THAT MAY RESULT IN INJURY OR HARM TO THE HEALTH OF A PERSON**

There are a number of ways of identifying potential sources of injury or disease. Selection of the appropriate procedure will depend on the type of work processes and hazards involved.

Procedures may range from a simple checklist for a specific piece of equipment or substance to a more open-ended appraisal of a group of related work processes. A combination of methods may provide the most effective results.

Methods of identifying workplace hazards include:

- developing a hazard checklist;
- conducting walk-through surveys;
- reviewing information from designers or manufacturers;
- analysing unsafe incidents, accident and injury data;
- analysing work processes;
- consulting with employees;
- examining and considering material safety data sheets and product labels; and
- seeking advice from specialist practitioners and representatives.

Some hazards such as mechanical hazards, noise, or the toxic properties of substances, are inherent in the work process. Other hazards result from equipment or machine failures and misuse, control or power system failures, chemical spills, and structural failures.

The table below lists some types of hazards together with some specific examples.

The table below lists some types of hazards together with some specific examples.

HAZARD	EXAMPLES	OUTCOMES (examples of injury or harm)
Manual handling Falls	overexertion/repetitive movement falling objects, falls, slips and trips of people	sprains, strains, fractures fractures, bruises, lacerations, dislocations, concussion, permanent or fatal injuries
Electricity Machinery and equipment	electrical current, lightning being hit, hitting objects, being caught in or between, over-turning vehicles	shock, burns, electrocution cuts, bruises, dislocations, fractures, amputation, permanent or fatal injuries
Hazardous substances Extremes of temperature	chemicals such as acids, hydrocarbons, heavy metals effects of heat or cold	toxic effects, dermatitis, respiratory illnesses, cancers burns, frost bite, heat stress, heat stroke
Noise Radiation	excessive noise ultra violet, welding arc flashes, micro waves, lasers	permanent hearing damage burns, cancer, damaged eye sight, blindness
Biological	viruses, bacteria, fungi, toxins	Hepatitis, Legionnaire's disease, Q Fever, tetanus, HIV/AIDS, allergies
Vibration Psychological stress	hands and whole of body intimidation, organisational change, violence, conflict, time pressure	organ, nerve and muscle damage high blood pressure, headaches and migraine, anxiety, depression, absenteeism

### 1.3.2 Analysing and assessing risks

Risk, in relation to any injury and harm, means the probability of that injury or harm occurring.

Risk assessment of the hazards identified in the first step should result in a list of potential injuries or harm and the likelihood of these occurring. The potential for fatal injury should be considered for each identified hazard. If hazards are listed they should be in the order of the most to the least serious, eg. from fatal to minor injury.

In assessing risks, consideration should be given to the state of knowledge about the frequency of injury or disease, the duration of exposure to injury or disease sources and the likely severity of the outcomes. Knowledge gained from similar workplaces or similar processes may be relevant to this risk assessment. Items to be considered include:

- frequency of injury – how often is the hazard likely to result in an injury or disease?
- duration of exposure – how long is the employee exposed to the hazard?
- outcome – what are the consequences or potential severity of injury?

Assessing these three factors will indicate the probability or likelihood of injury or harm occurring to workers involved in a particular work process. It also indicates the likely severity of this harm.

Risk assessment requires good judgment and awareness of the potential risks of a work process. Any person undertaking the risk assessment must have knowledge and experience of the work process. Risk assessment will be more complicated or difficult if the data or information regarding hazards of a work process is incomplete.

In some cases it may be necessary to break down the activity or process into a series of parts and assess each part separately.

Risk assessment should include:

- assessing the adequacy of training or knowledge required to work safely;
- looking at the way the jobs are performed;
- looking at the way work is organised;
- determining the size and layout of the workplace;
- assessing the number and movement of all people on the site;
- determining the type of operation to be performed;
- determining the type of machinery and plant to be used;
- examining procedures for an emergency (eg. accident, fire and rescue); and
- looking at the storage and handling of all materials and substances.

This step should provide information where and which employees are likely to be at risk of incurring injury or disease, how often this is likely to occur, and the potential severity of that injury or disease risk.

### 1.3.3 Identifying control measures

The final step in risk assessment is to determine the control measures that need to be taken and the ongoing review of those measures. There is a hierarchy or preferred order of control measures ranging from the most effective to the least effective. The preferred order is outlined in the table below.

The control of occupational injury and disease risks should preferably be dealt with by design, substitution, redesign, separation or administration. These controls generally eliminate, reduce or minimise risk in a more reliable manner than personal protective equipment.

Controls involve implementing measures which reduce the hazard and risk in the workplace.

Where regulations require specific methods to control the risk, these must be complied with.

TABLE 2 - HIERARCHY OR PREFERRED ORDER OF CONTROL

**elimination** - removing the hazard or hazardous work practice from the workplace. This is the most effective control measure;

**substitution** - substituting or replacing a hazard or hazardous work practice with a less hazardous one;

**isolation** - isolating or separating the hazard or hazardous work practice from people involved in the work or people in the general work areas from the hazard. This can be done by installing screens or barriers or marking off hazardous areas;

**engineering control** - if the hazard cannot be eliminated, substituted or isolated, an engineering control is the next preferred measure. This may include modifications to tools or equipment, providing guarding to machinery or equipment;

**administrative control** - includes introducing work practices that reduce the risk. This could include limiting the amount of time a person is exposed to a particular hazard; and

**personal protective equipment** - should be considered only when other control measures are not practicable or to increase protection.

**Control measures are not mutually exclusive. That is, there may be circumstances where more than one control measure should be used to reduce exposure to hazards.**

In some instances, a combination of control measures may be appropriate. Control measures should be designed:

- to eliminate or reduce the risks of a hazardous work process and to minimise the effects of injury or disease; and
- to reduce the risk of exposure to a hazardous substance.

### 1.3.4 Control through personal protective equipment

Personal protective equipment should be used in circumstances where other methods of control are not practicable or where there is a need to increase the level of protection. The factors which determine the appropriateness of using personal protective equipment include:

- the nature of the work or the work process concerned;
- the severity of any potential injury or disease;

- the state of knowledge about the injury or disease related to the work or process;
- information available to employers about methods of preventing injury or disease associated with a particular hazard or risk;
- the availability and suitability of methods to prevent, remove or mitigate causes of injuries or diseases associated with a hazard or risk; and
- whether the costs of preventing, removing or mitigating that injury or disease are prohibitive in the circumstances.

There are some situations where temporary use of personal protective equipment may be necessary. These include:

- where it is not technically feasible to achieve adequate control of the hazard by other measures.

In these cases, the hazard should be reduced as far as practicable by other measures and then, in addition, suitable personal protective equipment should be used to secure adequate control;

- where a new or revised risk assessment indicates that personal protective equipment is necessary to safeguard safety and health until such time as adequate control is achieved by other methods, for example, where urgent action is required because of plant failure; and
- during routine maintenance operations. Although exposure to hazards occurs regularly during such work, the infrequency and small number of people involved may make other control measures impracticable.

### 1.3.5 Review of control measures

Constantly reviewing control measures is important to ensure they continue to prevent or control exposure to hazards or hazardous work practices.

Engineering controls should be regularly tested to ensure their effectiveness. Performance testing and evaluation standards should be established.

Repair and maintenance programs should specify:

- where servicing is required;
- the extent of servicing required;
- the nature of the servicing required;
- the frequency of servicing;
- who is responsible for maintaining repair and maintenance programs; and
- how defects will be corrected.

In order to keep accurate records, a recording or reporting system should be developed, implemented and maintained.

## 1.4 The Meaning of Practicable

Some of the general duty provisions in the Act and some requirements in the Regulations are qualified by the words “so far as is practicable”.

“Practicability” applies to general duties for employers, self-employed people, people with control of workplaces, designers, manufacturers, importers, suppliers, erectors and installers, and to certain requirements in the Regulations.

These people are expected to take practicable and reasonable measures to comply with the requirements.

If something is practicable, it is capable of being done. Whether it is also reasonable takes into account:

- the severity of any injury or harm to health that may occur;
- the degree of risk (or likelihood) of that injury or harm occurring;
- how much is known about the hazard and the ways of reducing, eliminating or controlling it; and
- the availability, suitability and cost of the safeguards.

The risk and severity of injury must be weighed up against the overall cost and feasibility of the safeguards needed to remove the risk.

Common practice and knowledge throughout the relevant industry are taken into account when judging whether a safeguard is “reasonably practicable”. Individual employers could not claim that they did not know what to do about certain hazards if those hazards are widely known by others in the same industry, and safeguards were available.

The cost of putting safeguards in place is measured against the consequences of failing to do so. It is not a measure of whether the employer can afford to put the necessary safeguards in place.

While cost is a factor, it is not an excuse for failing to provide appropriate safeguards, particularly where there is risk of serious, or frequent but less severe, injury.

Where a regulation exists and is not qualified by the words “as far as is practicable”, the regulation must be complied with as a minimum requirement.

The WorkSafe Western Australia Commission guidance note *The General Duty of Care in Western Australian Workplaces* provides detailed information on the ‘duty of care’. The guidance note can be purchased from WorkSafe Western Australia, Westcentre, 1260 Hay Street, West Perth [Tel. (08) 9327 8777] or is available via the Internet Service on Safetyline [<http://www.safetyline.wa.gov.au>].

# Appendix 2: Occupational Safety and Health Regulations 1996 (in part) and including Schedule 5.2

## Definitions (in part)

1.3 In these regulations, unless the contrary intention appears -

“**competent person**”, in relation to the doing of anything, means a person who has acquired through training, qualification or experience, or a combination of those things, the knowledge and skills required to do that thing competently;

## Identification of hazards, and assessing and addressing risks, at workplaces

### Regulation 3.1 states

A person who, at a workplace, is an employer, the main contractor, a self-employed person, a person having control of the workplace or a person having control of access to the workplace must, as far as practicable -

- (a) identify each hazard to which a person at the workplace is likely to be exposed;
- (b) assess the risk of injury or harm to a person resulting from each hazard, if any, identified under paragraph (a); and
- (c) consider the means by which the risk may be reduced.

## Persons at workplaces to have access to Act etc.

### Regulation 3.2 states

A person who, at a workplace, is an employer or the main contractor must ensure that, as soon as practicable following a request from a person who works at the workplace, there is available for that person's perusal an up to date copy of -

- (a) the Act;
- (b) these regulations;
- (c) all Australian Standards, Australian/New Zealand Standards and NOHSC documents or parts of those Standards or documents referred to in these regulations that apply to that workplace;
- (d) all codes of practice approved under section 57 of the Act that apply to that workplace; and
- (e) guidelines or forms of guidance referred to in section 14 of the Act \_
  - (i) the titles of which have been published in the Government Gazette and which are set out in Schedule 3.1; and

- (ii) which apply to that workplace.

### **Manual handling**

#### **Regulation 3.4 states**

- (1) In this regulation \_

“**manual handling**” means any activity requiring the use of force exerted by a person to lift, lower, push, pull, carry or otherwise move, hold or restrain a person, animal or thing.

- (2) Without limiting regulation 3.1, a person who, at a workplace, is an employer, the main contractor or a self-employed person must, as far as practicable -
  - (a) identify each hazard that is likely to arise from manual handling at the workplace;
  - (b) assess the risk of injury or harm to a person resulting from each hazard, if any, identified under paragraph (a); and
  - (c) consider the means by which the risk may be reduced.

### **Emergency egress from workplaces**

#### **Regulation 3.8 states**

A person who, at a workplace, is an employer, the main contractor, a self-employed person or a person having control of access to the workplace must ensure that the means of emergency egress from the workplace enable safe egress from the workplace in the event of an emergency.

### **Warning signs**

#### **Regulation 3.11 states**

Without limiting any other requirement of these regulations for the display of signs, if, in an area of a workplace there is a hazard which may not be readily apparent to a person working in or entering the area then a person who, at the workplace, is an employer, the main contractor, a person having control of the workplace or a person having control of access to the workplace must ensure that -

- (a) a sign relevant to each hazard is displayed to persons in or entering the area; and
- (b) the sign complies, and is used in accordance, with AS 1319.

### **Air temperature**

#### **Regulation 3.15 states**

An employer must ensure -

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

enable employees to work in a comfortable environment.

### **Risks to be reduced in first instance by means other than protective clothing and equipment**

#### **Regulation 3.32 states**

When a person is considering, for the purposes of regulation 3.1(c), the means by which a risk may be reduced, the person is to -

- (a) firstly consider the means other than the use of protective clothing and equipment by which the risk might be reduced; and
- (b) then consider the use of protective clothing and equipment to the extent that it is not practicable to reduce the risk by means other than the use of protective clothing and equipment.

### **Responsibilities of persons who require personal protective clothing and equipment to be used**

#### **Regulation 3.34 states**

- (1) If a person is required under any of these regulations to identify a hazard at a workplace and to assess the risk of injury or harm to a person resulting from the hazard and the person concludes from the assessment process that personal protective clothing or equipment should be used at the workplace then the person must ensure that -
    - (a) the person who uses the clothing or equipment is instructed in relation to the correct fitting, use, selection, testing, maintenance and storage of the clothing or equipment;
    - (b) the person who uses the clothing or equipment is informed of the limitations in the use of the clothing or equipment;
    - (c) the clothing or equipment is maintained in good working order;
    - (d) the clothing or equipment is replaced -
      - (i) when it no longer provides the level of protection required to protect the wearer or user against the particular hazard;
      - (ii) when the safe working life, as specified by the person who manufactured the clothing or equipment, has expired; or
      - (iii) subject to subregulation (2), when it is damaged and cannot be repaired;
- and
- (e) the area of a workplace at which the clothing or equipment is required to be used by a person other than the person who provides the clothing or equipment is identified by signs in accordance, and complying, with AS 1319.
- (2) A person does not commit an offence under subregulation (1)(d) if, proof of which is on the person, the clothing or equipment is repaired rather than replaced and -
    - (a) the repair is done by a competent person;
    - (b) the repair is done according to the specifications of the manufacturer of the equipment; and
    - (c) any replacement part used in the repair is that which is specified by the manufacturer of the equipment as

the correct replacement part.

### Responsibilities of users of personal protective clothing and equipment

#### Regulation 3.35 states

A person to whom personal protective clothing or equipment is provided or made available for use at a workplace -

- (a) must use the protective clothing or equipment in a manner in which he or she has been properly instructed to use it;
- (b) must not misuse or damage the clothing or equipment; and
- (c) must, as soon as practicable after becoming aware of any \_
  - (i) damage to;
  - (ii) malfunction of; or
  - (iii) need to clean or sterilize,

the clothing or equipment, notify the person providing the clothing or equipment of the damage, malfunction or need to clean or sterilize the clothing or equipment.

### Safety helmets to be worn at construction sites

#### Regulation 3.36 states

If there is a risk of a person being struck on the head by a falling object at a construction site then the main contractor must ensure that -

- (a) at all times when the person is at risk, the person wears a safety helmet complying with the relevant requirements of AS 1801; and
- (b) there is displayed at each entrance to the site a safety sign bearing the words \_SAFETY HELMET AREA - HELMETS MUST BE WORN AT THIS SITE\_ and that otherwise complies with AS 1319.

#### Regulation 3.37 states

In this Subdivision -

“**filter**” means a filter that complies with the requirements of AS/NZS 1715;

“**oxygen deficient atmosphere**” means an atmosphere containing less than 19.5% oxygen;

“**self-contained breathing apparatus**” means a type of supplied air respirator which is carried by the user and supplies the user with respirable air from a source carried by the user;

“**supplied air respirator**” means a device which, by means of an air line, air hose or apparatus carried by the user, supplies the user with respirable air from a source other than the ambient atmosphere;

“**toxic atmosphere**”, in relation to a workplace, includes -

- (a) an atmosphere in which there is an atmospheric contaminant in a concentration exceeding the exposure standard for the contaminant specified in the National Exposure Standards [NOHSC: 1003 (1995)];
- (b) where an inspirable dust or respirable dust is not within the scope of the Exposure Standards referred to in paragraph (a), an atmosphere in which a person at the workplace would be exposed to -

- (i) the inspirable dust that, when measured in accordance with AS 3640, exceeds 10 milligrams per cubic metre of air; or
- (ii) the respirable dust that, when measured in accordance with AS 2985, exceeds 5 milligrams per cubic metre of air,

as an average over a work period of 8 hours; and

- (c) an atmosphere containing gas, vapour, dust or any other particle which is, or is in a concentration that is, a risk to the safety and health of a person at the workplace.

### **Identification and assessment of hazards in relation to atmosphere**

#### **Regulation 3.38 states**

Without limiting regulations 3.1 and 3.32, a person who, at a workplace, is an employer, the main contractor or a self-employed person must -

- (a) identify each hazard arising from an oxygen deficient atmosphere or a toxic atmosphere to which a person at the workplace is likely to be exposed;
- (b) assess the risk of injury or harm to a person resulting from each hazard, if any, identified under paragraph (a); and
- (c) consider whether the risk may be reduced by any of the means referred to in regulation 3.39.

### **Possible means of reducing risks**

#### **Regulation 3.39 states**

The means referred to in regulation 3.38(c) are -

- (a) the use of an effective ventilation system for the workplace;
- (b) the provision of an exhaust system that effectively extracts any contaminant and which is arranged so as to prevent re-entry of the extracted air into the workplace; and
- (c) such other means as would prevent persons at the workplace from being exposed to an oxygen deficient atmosphere or a toxic atmosphere,

as is appropriate to the particular case.

### **Respiratory protective equipment generally**

#### **Regulation 3.40 states**

- (1) In this regulation -

“toxic atmosphere” means any toxic atmosphere that is of a kind other than a kind referred to in any of paragraphs (b) to (f) of regulation 3.41.

- (2) To the extent that it is not practicable to prevent, by any of the means referred to in regulation 3.39, a person at a workplace from being exposed to a toxic atmosphere a person who, at the workplace, is an employer, the main contractor or a self-employed person must ensure that each person who may be so exposed is provided with respiratory protective equipment -
- (a) selected in accordance with AS/NZS 1715 to suit the circumstances of the case and that is used and

maintained in accordance with that Standard; and  
(b) complying with the relevant requirements of AS/NZS 1716.

- (3) Nothing in regulation 3.41 prevents a person from concluding, for purposes of subregulation (2), that the appropriate respiratory protective equipment in a particular case is equipment of a kind referred to in regulation 3.41.
- (4) A person who, at a workplace, is an employer, the main contractor or a self-employed person and who provides for use at a workplace respiratory protective equipment of any kind must ensure that the equipment is readily accessible to persons at the workplace who may need to use the equipment.

### **Supplied air respirators required for certain atmospheres**

#### **Regulation 3.41 states**

To the extent that it is not practicable to prevent, by any of the means referred to in regulation 3.39, a person at a workplace from being exposed to

- (a) an oxygen deficient atmosphere;
- (b) an atmosphere in which the level of toxic gases or vapours exceeds the capability of an air-purifying device;
- (c) a toxic atmosphere where the level of contamination is not known;
- (d) a toxic atmosphere in which the person is required to remain for a period longer than the estimated life of a filter;
- (e) an atmosphere that presents an immediate danger to life or health; or
- (f) a toxic atmosphere which contains a contaminant against which there is no suitable filter,

a person who, at the workplace, is an employer, the main contractor or a self-employed person must ensure that each person who may be so exposed is provided with a supplied air respirator.

### **Duties in relation to provision of supplied air respirators etc.**

#### **Regulation 3.42**

If a person is required, under regulation 3.40 or 3.41, to ensure that a supplied air respirator is provided for use at a workplace then the person must -

- (a) assess the number of sets of supplied air respirators that should be provided for regular, emergency or rescue purposes at the workplace;
- (b) assess whether self-contained breathing apparatus should be provided for emergency use and rescue at the workplace and, if so, the number of sets of such apparatus that should be provided;
- (c) ensure that each supplied air respirator provided for use at the workplace -
  - (i) has been selected in accordance with AS/NZS 1715 to suit the circumstances of the case and is used and maintained in accordance with that Standard; and
  - (ii) complies with relevant requirements of AS/NZS 1716;
- (d) in the case of a supplied air respirator by which air is supplied to the user by means of an air line or air hose, assess whether there should be provided for use at the workplace a device that warns when the air supply is about to fail;
- (e) assess whether there should be provided for use at the workplace a supplied air escape type-respirator in

the event that the flow of supplied air fails; and

- (f) ensure that each person required to use a supplied air respirator for emergency or rescue purposes at a workplace is trained in the use of the equipment and in emergency procedures.

### **Specifications, maintenance, testing of supplied air respirators**

#### **Regulation 3.43 states**

Without limiting regulation 3.34, if a person is required, under regulation 3.40 or 3.41, to ensure that a supplied air respirator is provided for use at a workplace then the person must also ensure that –

- (a) the compressor, filters and respirator supplying air to breathe –
  - (i) are maintained in efficient working order and in accordance with the manufacturer’s instructions; and
  - (ii) are inspected before and after each use and during cleaning;
- (b) the respirator is kept in a place where it will not be contaminated;
- (c) the equipment for the supply of air to breathe or the compressor incorporates a mechanism to cut off the air supply to the respirator in the event that the equipment or compressor heats beyond the manufacturer’s specifications for the maximum temperature at which the equipment or compressor will function properly;
- (d) the respirator and air supply have couplings of a type that requires at least 2 deliberate actions to separate the connector or coupling and are of a design that is different from that of other compressed gas and air services, if any, at the workplace;
- (e) the air supply or compressor has a receiver of sufficient capacity to reduce pulsation from compressor action;
- (f) the quality of air supplied to the respirator is tested regularly to ensure that it is in accordance with regulation 3.44; and
- (g) records are kept of –
  - (i) the purchase dates of the respirator and the compressor;
  - (ii) the maintenance of the respirator and compressor;
  - (iii) the date and result of each test conducted on the respirator;
  - (iv) the name and address of the person who conducted each test; and
  - (v) the –
    - (I) volume of air;
    - (II) odour;
    - (III) volume of oxygen, carbon monoxide, carbon dioxide, oil and water in the sample of air tested; and
    - (IV) temperature of the sample.

### **Quality of air in supplied air respirators**

#### **Regulation 3.44 states**

If a person is required, under regulation 3.40 or 3.41, to ensure that a supplied air respirator is provided for use at a workplace then the person must also ensure -

- (a) that air supplied to the supplied air respirator is supplied at a minimum rate of 170 litres per minute per person measured at the respirator;
- (b) that air supplied to the supplied air respirator has passed through an efficient purifying device so that the air -
  - (i) does not have an objectionable or nauseous odour;

- (ii) contains not less than 19.5% and not more than 22% by volume of oxygen; and
- (iii) at 15°C and 100 Kpa absolute -
  - (I) contains not more than 11 mg/m<sup>3</sup> (10 ppm by volume) of carbon monoxide;
  - (II) contains not more than 1400 mg/m<sup>3</sup> (800 ppm by volume) of carbon dioxide;
  - (III) contains not more than 1 mg/m<sup>3</sup> (1 ppm) of oil;
  - (IV) if in a cylinder, contains not more than 100 mg/m<sup>3</sup> of water when sampled from the cylinder when it is initially filled to a pressure of at least 12 MPa; and
  - (V) if used for diving, contains not more than 900 mg/m<sup>3</sup> (480 ppm by volume) of carbon dioxide;

and

- (c) where the air is to be supplied from a compressor to a face-piece, hood or helmet, that the air has passed through -
  - (i) a conditioner to ensure that the temperature of the air is not less than 15° Celsius and not more than 25° Celsius;
  - (ii) an efficient condensate trap fitted with a drain cock for the removal of any condensed liquid; and
  - (iii) an efficient ring circuit or controlled leak-off for the elimination of stale air.

### Interpretation

#### Regulation 3.45 states

In this division -

“**exposure standard for noise**”, in relation to a person, means -

- (a) an  $L_{Aeq,8h}$  of 85dB(A); or
- (b) an  $L_{peak}$  of 140 dB(C),

measured at the position of the person’s ear without taking into account any protection which may be provided to the person by personal hearing protectors.

“ $L_{Aeq,8h}$ ” means an 8 hour equivalent continuous A-weighted sound pressure level in decibels (dB(A)) referenced to 20 micropascals, that is to say, the steady noise level which would, in the course of an 8 hour period, cause the same A-weighted sound energy that would be caused by the actual noise during an actual working day, determined in accordance with AS/NZS 1269.1;

“ $L_{peak}$ ” means peak noise level, that is to say, the linear (unweighted) peak hold sound pressure level in decibels (dB(lin)) referenced to 20 micropascals determined in accordance with AS/NZS 1269.1;

“**noise**” means any unwanted or damaging sound;

“**personal hearing protectors**” means a device, or pair of devices, worn by a person or inserted in the ears of a person to protect the person’s hearing.

#### Avoidance of noise above exposure standard

#### Regulation 3.46 states

A person who, at a workplace, is an employer, the main contractor or a self-employed person must, as far as practicable, ensure that noise to which a person is exposed at the workplace does not exceed the exposure standard for noise.

### **Standard of personal hearing protectors**

#### **Regulation 3.47 states**

If it is not practicable to avoid exposing a person at a workplace to noise above the exposure standard for noise then a person who, at the workplace, is an employer, the main contractor or a self-employed person must ensure that the first-mentioned person is provided with personal hearing protectors that have been selected in accordance with the procedures specified in AS/NZS 1269.3.

### **Identification and assessment of hazards in relation to falling**

#### **Regulation 3.49 states**

Without limiting regulation 3.1, a person who, at a workplace, is an employer, the main contractor, a self-employed person, a person having control of the workplace or a person having control of access to the workplace must -

- (a) identify each hazard to which a person at the workplace is likely to be exposed in relation to the person falling from one level to another at the workplace;
- (b) assess the risk of injury or harm to a person resulting from each hazard, if any, identified under paragraph (a); and
- (c) consider whether the risk may be reduced by any of the means referred to in regulation 3.50.

### **Possible means of reducing risks**

#### **Regulation 3.50 states**

The means referred to in regulation 3.49(c) are -

- (a) the provision of edge protection;
- (b) the use of a building maintenance unit that is installed by a competent person;
- (c) the use of a scaffold or a working platform;
- (d) where it is not practicable to provide the equipment referred to in paragraph (b) or (c), the use of an industrial fall-arrest system and device and an anchorage, each of which complies with AS/NZS 1891.1, AS/NZS 1891.3, AS 2626 and AS 4626;
- (e) the use of ladders;
- (f) the provision of training -
  - (i) in the use of fall-arrest systems and devices and personal protective equipment and in rescue procedures; and
  - (ii) that is otherwise relevant to the hazards that may be encountered;

- (g) the provision of supervision by a competent person; and
- (h) the provision of assistance by another person, as may be appropriate to the particular case, and include any other means relevant to the particular case.

### Definition

#### Regulation 3.82 states

In this Division -

“**confined space**” means an enclosed or partially enclosed space which -

- (a) is not intended or designed primarily as a workplace;
- (b) is at atmospheric pressure during occupancy; and
- (c) has restricted means for entry and exit, and which either -
  - (i) has an atmosphere containing or likely to contain potentially harmful levels of contaminant;
  - (ii) has or is likely to have an unsafe oxygen level; or
  - (iii) is of a nature or is likely to be of a nature that could contribute to a person in the space being overwhelmed by an unsafe atmosphere or a contaminant;

“**contaminant**” means any substance, the presence of which may be harmful to safety or health.

### Work in confined spaces to comply with Standard

#### Regulation 3.85 states

A person who, at a workplace, is an employer, the main contractor or a self-employed person must ensure that the provisions of AS 2865 are complied with in relation to work done in a confined space at the workplace.

### Definitions

#### Regulation 3.102 states (in part)

“**abrasive blasting**” means propelling a stream of abrasive material at high speed against a surface by means of compressed air, liquid, steam, centrifugal wheels or paddles for the purpose of cleaning, abrading, etching or otherwise changing the original appearance or condition of the surface.

### Blasting equipment

#### Regulation 3.103 states

- (1) A person who, at a workplace, is an employer, the main contractor or a self-employed person must ensure that equipment used for the purposes of abrasive blasting at the workplace -
  - (a) is designed so that the person operating the nozzle can control the flow of abrasive material through the nozzle;
  - (b) has hose whip checks or hose coupling safety locks or both;
  - (c) in the case of equipment used for dry abrasive blasting, has an efficient means for the discharge of static electrical charge from the abrasive blasting nozzle; and
  - (d) in the case of equipment used for wet abrasive blasting, has a water flow rate sufficient to prevent the generation of dust.

- (2) A person who, at a workplace at which equipment is used for the purposes of abrasive blasting, is an employer, the main contractor, or a self-employed person must ensure that -
- (a) the equipment includes a device designed to cut off automatically the flow of abrasive material through the nozzle if the person operating the nozzle becomes unable to do so; or
  - (b) procedures are in place which enable a person other than the person operating the nozzle to cut off the flow of abrasive material if the person operating the nozzle becomes unable to do so.

### **Blasting chambers and cabinets**

#### **Regulation 3.104 states**

A person who, at a workplace, is an employer, the main contractor or a self-employed person must ensure that each blasting cabinet or blasting chamber at the workplace -

- (a) is constructed of hard wearing non-combustible materials;
- (b) is designed and maintained -
  - (i) to prevent the escape of dust; and
  - (ii) to minimize internal projections on which dust may settle;
- (c) which has any window or inspection port -
  - (i) has each such window or inspection port fixed in a metal sash;
  - (ii) has each such window or inspection port maintained so as to permit effective inspection of operations; and
  - (iii) that is glazed, has glass that is toughened safety glass, laminated safety glass or safety wired glass manufactured to the requirements of AS 2208 for each such glazed window or inspection port; and
- (d) has a mechanical exhaust system that effectively extracts the dust from the blasting cabinet or the blasting chamber and which is arranged so as to prevent re-entry of the extracted dust into the blasting cabinet or blasting chamber and the workplace.

### **Lighting and exits for blasting chambers**

#### **Regulation 3.105 states**

A person who, at a workplace, is an employer, the main contractor or a self-employed person must ensure that each blasting chamber at the workplace -

- (a) has illumination to at least 200 lux, measured on a horizontal plane situated one metre above the floor; and
- (b) has 2 exits -
  - (i) located as far from each other as is practicable; and
  - (ii) both of which are fitted with a quick release system.

### **Persons doing abrasive blasting to be protected**

#### **Regulation 3.106 states**

If, at a workplace, a person does abrasive blasting of a kind other than abrasive blasting done in a blasting cabinet, then a person who, at the workplace, is an employer, the main contractor or a self-employed person must ensure that -

- (a) the first mentioned person is provided with a supplied air respirator which is fitted with an inner bib; and
- (b) the first-mentioned person wears a shoulder cape, jacket or protective suit.

### **Radioactive substances not to be used in abrasive blasting**

**Regulation 3.107 states**

A person who, at a workplace, is an employer, the main contractor or a self-employed person must ensure that no material containing any radioactive substance as defined in the *Radiation Safety Act 1975* is used in any abrasive blasting at the workplace.

**Certain uses of certain hazardous substances prohibited**

**Regulation 5.14 states**

A person who, at a workplace, is an employer, a main contractor or a self-employed person must ensure that a hazardous substance of a kind set out in column 1 of Schedule 5.2 is not used or handled at the workplace in the manner set out opposite that hazardous substance in column 2 of that Schedule.

**Identification and assessment of asbestos hazards at workplaces**

**Regulation 5.43 states**

Without limiting regulation 3.1 or 5.15, a person who, at a workplace, is an employer, the main contractor, a self-employed person or the person having control of the workplace must ensure that -

- (a) the presence and location of asbestos at the workplace is identified; and
- (b) the process of identification referred to in paragraph (a) and the assessment of risks arising from hazards in relation to asbestos at the workplace are conducted in accordance with the Guide to the Control of Asbestos Hazards in Buildings and Structures [NOHSC:3002(1988)].

**Asbestos cement building materials**

**Regulation 5.50 states**

A person who, at a workplace, is an employer, the main contractor, a self-employed person or the person having control of the workplace must ensure that -

- (a) any work involving the use or cleaning of asbestos cement building materials at the workplace is done in accordance with section 9 of the Code of Practice for the Safe Removal of Asbestos [NOHSC: 2002 (1988)]; and
- (b) any tool other than -
  - (i) a non-powered hand tool; or
  - (ii) a portable power tool incorporating dust suppression or dust extraction attachments designed to collect asbestos fibres,
 is not used in any work involving the use or cleaning of asbestos cement building materials at the workplace.

**Prohibition on use of compressed air and other techniques**

**Regulation 5.51 states**

A person must not use or cause or permit to be used at a workplace compressed air or other dry brushing, shaking or dry sweeping method in any work involving the use of asbestos or in relation to any equipment or clothing used in the work.

**Duties of employers, main contractors and self-employed persons in relation to work with lead**

**Regulation 5.60 states**

- (1) A person who, at a workplace other than a foundry, is an employer, the main contractor or a self-employed person must ensure that lead material (other than metallic lead) is not handled or moved at the workplace unless the material is damp.
- (2) A person who, at a workplace in which a lead process is conducted, is an employer, the main contractor or a self-employed person must ensure -
  - (a) that protective clothing which has been provided for a person working in a lead process is washed, cleaned or renewed once a week or more frequently where necessary to protect the health or safety of persons at the workplace;
  - (b) in the case of a workplace other than a construction site, that -
    - (i) any area for eating and drinking is air-locked from any room in which a lead process is conducted and that there is no door or other means of entry directly from such room into the area set aside for eating and drinking;
    - (ii) basins with hot and cold water are provided in the ratio of one basin to every 5 (or up to 5) persons who work in the lead process; and
    - (iii) showers are provided for the use of persons who work in the lead process;

and

- (c) in the case of a construction site, that running water is available to enable persons who work in the lead process to wash.

**Duties in relation to working with lead**

**Regulation 5.61 states**

A person who works in a lead process must -

- (a) not smoke while his or her hands are contaminated with lead material;
- (b) before eating or drinking and on ceasing the work, wash his or her face, neck, hands and arms in the wash room or facilities provided for that purpose; and
- (c) remove any contaminated clothing or personal protective equipment before entering an area set aside for the consumption of food.

## HAZARDOUS SUBSTANCES PROHIBITED FOR SPECIFIED USES OR METHODS OF HANDLING

[Regulation 5.14]

HAZARDOUS SUBSTANCES	PROHIBITED USE OR HANDLING
<b>COLUMN 1</b>	<b>COLUMN 2</b>
Any substance that consists of or contains asbestos	Application by spraying or installation as insulation
Any material that consists of or contains asbestos	High pressure cleaning of any such material
Installed insulation that consists of or contains asbestos	Sealing of such insulation
A substance that consists of or contains crystalline silicon dioxide	As an abrasive material in abrasive blasting except where less than 2% dry weight of crystalline silicon dioxide is present as a contaminant
A recycled material that has not been treated to remove respirable dust	As an abrasive material in dry abrasive blasting
A substance capable of causing harm to the upper respiratory tract of a person	As an abrasive material in dry abrasive blasting
Any substance that contains more than -	As an abrasive material in abrasive blasting
0.1% antimony	
0.1% arsenic	
0.1% beryllium	
0.1% cadmium	
0.5% chromium	
0.5% cobalt	
0.1% lead	
0.5% nickel	
1.0% tin	
Any substance that contains chromate, nitrate or nitrite	As a wet abrasive blasting inhibitor in wet abrasive blasting
Polychlorinated biphenyls (PCBs)	All uses and handling except for bona fide research or analysis, handling for storage awaiting disposal, handling for removal and disposal, handling for repairs*, and when contained in existing electrical equipment and construction materials

\* "Repairs" in relation to PCBs includes -

- (a) the controlled removal of PCBs from a piece of equipment to undertake repairs followed by the replacement of PCBs with non-PCB fluid and then the separate disposal of the PCBs;
- (b) the clean-up and disposal of PCBs that have spilled, leaked or otherwise escaped from the containment;
- (c) the clean-up and disposal of materials contaminated with PCBs during a process referred to in paragraph (a) or (b), but does not include the return of spilled PCBs back into the container from which there was an uncontrolled loss of containment, or into any other container except if placed in that container for disposal.