

CODE OF PRACTICE

# Prevention of Falls at Workplaces

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## **Foreword**

The introduction of the *Occupational Safety and Health Act 1984* enabled the establishment of the tripartite Commission for Occupational Safety and Health. The Commission, which comprises representatives of employers, unions, government and experts, 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 inquiries and publish and disseminate information.

This code of practice has been developed through the tripartite consultative process and the views of the employers and unions along with those of government and experts have been considered.

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

The information presented in this booklet should be read by employers and employees as background for understanding and implementing this code of practice.

## **The Act**

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

The Act places certain duties on employers, employees, self-employed people, manufacturers, designers, importers and suppliers.

It also places emphasis on the prevention of accidents and injury.

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

## **Regulations**

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

Regulations may prescribe minimum standards and have a general application or they may define specific requirements related to a particular hazard or particular type of work. They may also allow the licensing or granting of approvals and certificates etc.

## **Codes of practice**

A code of practice is defined in the Act as a document prepared for the purpose of providing:

- practical advice on preventive strategies; and
- a practical means of achieving any code, standard, rule, provision or specification relating to occupational safety and health in Western Australia.

A code of practice may contain explanatory information.

The preventive strategies outlined in a code of practice do not represent the only acceptable means of achieving the standard to which the code refers. A code of practice does not have the same legal force as a regulation and is not sufficient reason, of itself, for prosecution under the Act.

**commission  
for occupational  
safety and health**

**CODE OF PRACTICE**

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# **Prevention of Falls at Workplaces**

This code of practice is a revised and updated version of the WorkSafe Western Australia Commission's *Code of Practice: Prevention of Falls at Workplaces* published in 1997. (The Commission is now known as the Commission for Occupational Safety and Health.) Representatives from employer organisations, trade unions, Government and people with knowledge and expertise in occupational safety and health have undertaken the revision, ensuring that the interests of all parties at the workplace have been considered. This revised code is intended to provide practical guidance on meeting the requirements in the *Occupational Safety and Health Act 1984* and Occupational Safety and Health Regulations 1996 relating to prevention of falls at the workplace, including those that came into operation from 1 July 2001.

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## Scope

This code of practice applies to all workplaces in Western Australia covered by the *Occupational Safety and Health Act 1984*. It provides detailed guidance on the prevention of falls at workplaces. However, it is not possible to deal with every situation that may be found at workplaces, where there is the potential for a person to fall from, through or into any place or thing.

## Who should use this code of practice?

This code should be used by everyone who has a duty to prevent, as far as practicable, falls at workplaces. This includes employers, employees, self-employed people, architects, engineers, designers, builders, manufacturers, suppliers, safety and health representatives and safety and health committees. The practical guidance in this code of practice should be considered in conjunction with the general duties in the *Occupational Safety and Health Act 1984*.

## Definitions

For the purpose of this code of practice:

“**the Act**” refers to the *Occupational Safety and Health Act 1984*.

“**Australian Standard**”, “**Australian/New Zealand Standard**”, “**AS**” and “**AS/NZS**” refer to standards developed and published by Standards Australia. These are voluntary technical and commercial standards, which are sometimes referenced in the Occupational Safety and Health Regulations 1996. See Appendix 1 for more information.

“**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.

“**duty of the employer**”, where an employer has a duty under a provision of this code of practice to do something, but the employer is not the person in charge of the workplace at which an employee works, the employer has the same duty under that provision as the person in charge of the workplace has, except that the employer’s duty is limited to an employee.

“**falling**”, in this code of practice, is a reference to a person falling and includes a reference to a person falling from, through or into a place or thing.

“**person in charge of a workplace**” means the person who has the management or control of the workplace.

“**the Regulations**” or “**Regulation**” refer to regulations in the Occupational Safety and Health Regulations 1996.

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# 1. General duties at the workplace

The *Occupational Safety and Health Act 1984* (referred to in this document as the Act) contains general duties which describe the responsibilities of people who affect safety and health at work. These duties apply to the prevention of falls. The Act and the Occupational Safety and Health Regulations 1996 (referred to in this document as the Regulations) should be read in conjunction with this code of practice.

Employers must, so far as is practicable:

- provide a workplace and safe system of work so employees are not exposed to hazards;
- provide employees with information, instruction, training and supervision to enable them to work in a safe manner;
- consult and co-operate with safety and health representatives (if any) and other employees in matters related to safety and health at work;
- provide adequate protective clothing and equipment where hazards cannot be eliminated; and
- ensure plant can be used, cleaned, maintained, transported and disposed of safely.

See Appendix 3  
Section 19 of the  
Act.

## **Safe systems of work: workplace policies and procedures**

Policies and procedures should be developed and implemented for each workplace to ensure safe systems of work and include:

- hazard identification and risk assessment and control processes;
- monitoring performance and reviewing control measures;
- mechanisms for consulting with employees;
- induction and training programs;
- an agreed system for reporting and recording information on identified hazards or other relevant safety and health information;
- safe work methods (such as job or task procedures);
- ongoing inspection and maintenance programs;
- emergency rescue procedures; and
- review of safety management policies and procedures.

## **Other people at the workplace**

The Act also sets out duties for other parties at the workplace:

**Employees** must take reasonable care to ensure their own safety and health at work, and the safety and health of others affected by their work.

**Self-employed people** must take reasonable care to ensure their own safety and health at work and, as far as practicable, ensure their work does not affect the safety and health of others.

## **Employment or engagement of contractors and their employees**

The person (called the principal in the Act) must ensure the safety and health of anyone they engage (called

See Appendix 3  
Sections 20 and 21  
of the Act.

See Appendix 3  
Sub-Sections 19(4)  
and 19(5) of the Act.

the contractor in the Act) to do the work. The principal is considered to be the employer of a contractor and any people employed or engaged by the contractor to carry out the work. Thus the principal has an employer's 'duty of care' to contractors and their employees for matters over which the principal has control.

**Designers, manufacturers, importers and suppliers of plant** must ensure that plant intended for use in a workplace is safe to install, maintain and use at workplaces. Safety and health information must be provided when plant and substances are supplied for use at work, and whenever requested for substances.

See Appendix 3  
Section 23 of the  
Act.

**Designers and builders of a building or structure** for use at a workplace must ensure, so far as is practicable, that persons constructing, maintaining, repairing, servicing or using the building or structure are not exposed to hazards.

### **Further information**

The Commission's guidance note, *The General Duty of Care in Western Australian Workplaces* has more information on the 'duty of care' requirements. It is available on the Internet (at: [www.safetyline.wa.gov.au](http://www.safetyline.wa.gov.au)) or for purchase from WorkSafe at the Westcentre, 1260 Hay Street, West Perth [Tel. 08 9327 8777].

### **Consultation**

Consultation and co-operation between employers and employees are the keys to providing and maintaining a safe and healthy workplace.

See Appendix 3  
Section 19(1)(c) of  
the Act.

Employers are required to consult with safety and health representatives (if any) and employees on safety and health matters.

Employer and employee involvement in the process of identifying hazards from falls and assessing and controlling the risks will help to ensure that:

- the risks from falls are identified because employees are most likely to know about risks associated with their work;
- employees have a commitment to this process and any changes, such as control measures, that are implemented; and
- fall incidents are eliminated or minimised.

## 2. Hazard identification, risk assessment and risk control – the risk management process for the prevention of falls

### 2.1 An overview

Employers have a duty to ensure, as far as practicable, that employees are not exposed to hazards at the workplace. They can do this by following a risk management process to identify hazards and assess and control risks.

See Appendix 3  
Regulation 3.1.

In addition, there is a specific requirement for employers to carry out this risk management process for the prevention of falls. This involves a three step process to:

See Appendix 3  
Regulation 3.49.

- identify hazards;
- assess risks; and
- control risks.

To assist in identifying hazards where a person may fall and assessing and controlling the risks, consideration should be given to:

- previous injuries, ‘near miss’ incidents or accidents arising from falls which have occurred at the workplace or other similar workplaces;
- relevant codes of practice and guidance notes;
- consultation with employees, safety and health representatives (if any), safety and health committees, self employed people and contractors to find out what problems may be associated with performing tasks/jobs;
- walk through inspections of the workplace (consider using checklists); and
- any other records or statistics which indicate potentially unsafe work practices.

See the significant incident summary sheets published by WorkSafe and available on the internet at [www.safetyline.wa.gov.au](http://www.safetyline.wa.gov.au)

### 2.2 Identifying hazards

Identifying hazards involves recognising things that may cause injury or harm to the health of a person, such as where a person may fall from, through or into a place or thing.

A hazard means anything that may result in injury or harm to the health of a person

There are a number of ways to identify potential things or situations that may cause a fall to occur. Choosing an appropriate process or procedure for identifying hazards will depend on the nature of the work environment and hazards involved.

A hazard identification process or procedure may range from a simple checklist for specific equipment, such as a ladder or fall-arrest system inspection checklist, to a more open-ended appraisal of a group of related work processes. Generally, a combination of methods will provide the most effective results.

A hazard identification tool commonly used is the Job Safety Analysis (JSA).

See Appendix 4  
for a JSA form and examples.

## Common fall hazards checklist

Key things to check at the workplace include:

- **surfaces:**
  - the stability;
  - the fragility or brittleness;
  - the slipperiness (e.g. where surfaces are wet, polished, glazed or oily in the case of new steelwork);
  - the safe movement of employees where surfaces change;
  - the strength or capability to support loads; and
  - the slope of work surfaces (e.g. where they exceed 7°);
- **levels** (where levels change and employees may be exposed to a fall from one level to another);
- **structures** (the stability of temporary or permanent structures);
- **the ground** (the evenness and stability of ground for safe support of scaffolding or working platform);
- **the raised working area** (whether it is crowded or cluttered);
- **scaffolding** (the correct erection and dismantling);
- **edges** (edge protection for open edges of floors, working platforms, walkways, walls or roofs);
- **hand grip** (places where hand grip may be lost);
- **openings or holes** which will require identification or protection or **unguarded shafts or excavations**;
- **proximity of employees to unsafe areas:**
  - where loads are placed on elevated working areas;
  - when objects are below a work area, such as reo bars and star pickets;
  - where work is to be carried out above workers (e.g. potential hazards from falling objects); and
  - power lines near working areas;
- **movement of plant or equipment** (ensuring there is no sudden acceleration or deceleration);
- **access to, egress from and movement around the working area** (checking for obstructions);
- **manual handling** (checking safe work practices for carrying awkward materials, such as plaster boards and roof sheeting, which may be caught by the wind);
- **lighting**;
- **weather conditions** (when heavy rain, dew or wind are present);
- **footwear and clothing** (suitability for conditions);
- **ladders** (where and how they are being used); and
- **young, new or inexperienced employees** (i.e. employees unfamiliar with a task).

## 2.3 Assessing and analysing risks

This involves looking at the chance or likelihood of a fall occurring and, if a fall did occur, the extent of any harm or injury (i.e. the consequences). This is a way of deciding which hazards need to be tackled first (i.e. where there is the highest risk of falls).

This step should provide information on:

- where, which and how many employees are likely to be at risk of incurring injuries;
- how often this is likely to occur; and
- the potential severity of any injuries.

Risk assessment is not an absolute science – it is a ‘best estimate’ on the basis of the information available. It is therefore important that:

- a person undertaking a risk assessment has the necessary information, knowledge and experience of that work environment and work process; or
- the risk assessment involves people with information, knowledge and experience in the process.

In carrying out a risk assessment, it is necessary to break down each activity or process into a series of parts or smaller tasks and assess each one separately. A Job Safety Analysis can assist with this.

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

See Appendix 4 Job Safety Analysis.

### Information for risk assessments

Ways to determine the likelihood and potential consequences of each hazard include:

- looking at similar workplaces or processes;
- looking at the workplace’s previous incident and injury reports and data for falls;
- consulting with safety and health representatives (if any) and other employees;
- looking at the way tasks/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 at the workplace;
- determining the type of operation to be performed;
- identifying the type of machinery/plant to be used;
- assessing adequacy of inspection and maintenance processes;
- examining the way all materials and substances are stored and handled;
- assessing what knowledge and training is needed to perform tasks safely and the adequacy of current knowledge and training (e.g. gap analysis); and
- examining adequacy of procedures for all potential emergency situations (e.g. accidents and rescues).

## 2.4 Controlling risks

The next step is to implement control measures to eliminate or reduce the risk of a person being injured or harmed (e.g. eliminate or reduce the likelihood of a person falling) and to ensure those measures are monitored and reviewed on an ongoing basis.

There is a preferred order of control measures, ranging from the most effective to the least effective in eliminating or reducing the risk of falls. This is outlined below in Table 1.

The preferred way of controlling risk is by design, substitution, redesign, separation or administration. These control measures generally eliminate, reduce or minimise risk more effectively than personal protective equipment.

Specific regulations set out certain mandatory methods that are required to control the risk and some of these, such as the protection of holes and openings, are outlined later in this document.

**Table 1 Preferred order of control measures to eliminate or reduce the risk of falls**

- 1. Elimination** – removing the hazard or hazardous work practice from the workplace (e.g. eliminating the need to access the fall risk area such as by installing air conditioning units in the centre of the roof);
- 2. Substitution** – substituting or replacing a hazard or hazardous work practice with a less hazardous one (e.g. providing an alternative means of access such as a safe walkway so the risks of falls are avoided; or installing an elevating work platform for work at heights);
- 3. Isolation** – isolating or separating the hazard or hazardous work practice from people involved in the work or people in the general work areas (e.g. barricading or enclosing the fall risk area with edge protection, installing handrails and covering floor penetrations);
- 4. Engineering control** – if the hazard cannot be eliminated, substituted or isolated, an engineering control is the next preferred measure. This includes the use of a fall injury prevention system designed to restrain or arrest a person's fall from one level to another and minimise the risk of injury or harm to a person if they fall (e.g. a restraint system or fall-arrest system, catch platforms, safety nets and safety mesh). It may also include modifications to plant or providing guarding to machinery and equipment; and
- 5. Administrative control** – this includes introducing work practices that reduce the risk, such as implementing measures to ensure that procedures, instruction, training and warning signs are in place to warn and protect persons exposed to falls. This could also include limiting the amount of time a person is exposed to a particular hazard. These controls should be used in conjunction with physical controls and appropriate supervision.

**In some instances, a combination of control measures may be appropriate.**

**Most  
effective  
control  
measure**



**Least  
effective  
control  
measure**

Examples of control measures include:

- designing, planning and modifying plant, buildings and structures to prevent falls;
- looking at the way jobs can be done safely to eliminate or reduce the likelihood of a fall (e.g. checking that ladders are safe and used correctly);
- organising and sequencing work so that people do not interfere with or increase the risk of a fall for themselves or others;
- identification, collection and presentation of information and knowledge required by employees and contractors to enable them to work safely;
- identifying the training required to work safely if there is the risk of a fall; and
- identifying areas requiring non-slip surfaces for stairs or ladders.

### ***Other means of reducing the risk***

Other means of reducing risks may be more appropriate to a particular case than the ones mentioned in this section, if they can eliminate or reduce the risk of a fall.

For example, the erection of different communication towers and masts (many of which may require multi guy lines) and advertising and other types of signage on towers and structures will require consideration of other means of reducing the risks of falling.

The risks associated with maintenance and servicing plant and buildings must also be considered.

In all cases, the three basic steps of hazard identification, risk assessment and risk control must be carried out.

## **2.5 Monitoring and review of control measures**

Deciding on and implementing a risk control measure is not the end of the risk management process. It is important to constantly monitor and review control measures to ensure that they continue to prevent or control exposure to hazards or hazardous work practices.

A risk management process should be conducted as an ongoing process because workplaces are usually constantly changing environments with new hazards being introduced; for example, when new equipment or plant are introduced or the work environment or standards are changed.

In determining the frequency of the monitoring and review processes, consider such things as:

- the level of risk (high-risk hazards need more frequent assessments); and
- the type of work practice or plant involved (there may be particular stages in the life of a piece of equipment where more frequent assessments are appropriate).

Each workplace should:

- have a planned program of inspections and maintenance;
- undertake a review each time the work environment changes; and
- regularly review the process for hazard identification, risk assessment and risk control to ensure it is effective.

See Section 5  
Design and planning  
of plant, buildings  
and structures.

See Section 9  
Ladders.

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## ***Maintenance of plant, equipment and structures***

Maintenance and repair programs should be reviewed regularly to ensure their effectiveness. Performance testing and evaluation standards should be established.

Incorporating the manufacturer's recommendations, 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 maintenance records, a recording or reporting system should be developed, implemented and maintained.

### 3. Instruction and training

Employers must provide proper safety and health instruction and training to employees.

Instruction and training are an important part of ensuring safe systems of work and should take into account the functions of each employee and provide them with the necessary skills and knowledge to enable them to do their work safely.

In providing training, it is also essential to address the intent of the Act and Regulations so that employees understand that, in some instances, the prevention of falls depends on them doing a particular work activity in a particular way, such as when using ladders and fall injury prevention systems and working on fragile and brittle roofs.

The type of instruction and training given should include:

- general safety and health induction, including the ‘duty of care’ responsibilities under the Act and Regulations and workplace policies and procedures;
- task specific induction;
- ‘on the job’ training;
- ‘in house’ training programs designed to address specific needs, such as specific training for working from heights and correct use of ladders; and
- industry-based or formal training, such as accredited or certificated courses.

#### **Training programs**

In developing and implementing an effective training program, employers should include:

- analysis of training needs, including the identification of the tasks to be performed and associated hazards and risks;
- identification of any pre-requisites or entry standards;
- definition of learning objectives and clear identification of the extent/level of competencies to be achieved, such as what will be covered;
- selection of appropriate training aids depending on the environment and the targeted trainees (use of hardware, graphics, videos and printed materials);
- adequate assessment (e.g. the assessment includes a practical component where the trainee has to demonstrate applied skills);
- recognition of skills attained where applicable (e.g. accreditation or certification);
- delivery of training by a competent person; and
- evaluation of effectiveness of training.

#### **Induction**

Induction programs are essential:

- for new employees;

See Appendix 3  
Section 19(1)(b) of  
the Act.

For examples of  
regulations for  
specific work  
activities, see  
Appendix 3  
Regulation 3.26  
(ladders), Regulation  
3.55 (fall injury  
prevention systems)  
and Regulation 3.57  
(fragile and brittle  
roofs).

- where work situations have changed; and
- where work practices are being introduced for the first time.

In addition to providing general safety and health information, an induction should include:

- ‘on the job’ training, including how to carry out a job or task in a safe manner and not be exposed to falls;
- information on the hazards and risks from falls at that workplace;
- information on the selection, fitting, use, care, maintenance and storage of personal protective clothing and equipment, such as fall injury prevention equipment; and
- emergency rescue procedures.

### ***Further training or re-training***

Employees may need further training where:

- new methods, equipment, hazards, policies or procedures are introduced;
- the type of operation or environment changes; or
- their particular job requirements change.

### ***Certification or accreditation***

There may be occasions when a person is required to obtain formal accreditation or certification (for example, certificates of competency are required under the safety and health legislation for scaffolders, riggers and doggers).

Where a particular type of accreditation or certification is required before a job or task can be carried out, employers must ensure that such accreditation or certification is valid and current.

Employers must also ensure that people who are being trained to obtain accreditation or certification are supervised during the training.

The possession of a certificate of competency does not provide any exemption from the requirement for fall protection to be provided for a person working at heights.

### ***Prevention of falls training***

Training in the prevention of falls should include:

- safe work systems and practices to prevent falls, including how the systems installed prevent falls;
- hazard and incident/accident reporting systems;
- the correct selection, fitting, use, care, maintenance and storage of personal protective equipment (see the following page for fall injury prevention systems);
- correct selection, use, care and storage of tools and equipment to be used (for example, using a tool belt instead of carrying tools);
- emergency rescue procedures;
- safe methods of working on brittle and fragile material;

- electrical safety; and
- maintaining record keeping procedures and systems.

### ***Training in the use of fall injury prevention systems***

Where a fall injury prevention system is used, the instruction and training given should include at least:

- what each individual piece of equipment is intended for and how it works;
- the correct selection, fitting, use, care, inspection, maintenance and storage of individual fall-arrest and restraint equipment (in accordance with the manufacturer's instructions and Australian/New Zealand Standard, AS/NZS 1891.4), their strengths and weaknesses and the siting of temporary fall-arrest systems;
- the method to be used in carrying out a specified work task, including the access and attachment method;
- maintenance of evidence of training undertaken; and
- emergency rescue procedures.

See Section 20  
Emergency rescue  
procedures.

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## 4. Supervision

Employers must provide supervision to ensure that employees are not exposed to hazards and that they are taking reasonable care where there is a risk of falling from, through or into any place or thing.

Supervision by a competent person is important, especially if the people being supervised are undergoing training or are unfamiliar with the working environment.

Employers should monitor the work to ensure that agreed safe work practices are followed; for example, monitoring the use and care of fall injury prevention systems.

### ***Supervision of the use of fall injury prevention systems***

Where fall injury prevention systems are used, the employer must ensure that:

- only employees who have received training and instruction in relation to the system of work are authorised to carry out the work;
- employees use the fall injury prevention system in the correct manner; and
- adequate safety and health systems are in place, are functional, and safe work practices have been adopted and are used.

### ***Employees must follow instructions***

It is also important to ensure employees understand that they must comply, so far as they are reasonably able, with instructions given by their employer, where those instructions are for their own safety and health or for the safety or health of other persons.

See Page i for a definition of a competent person.

See Appendix 3 Section 20 of the Act and Regulation 3.55(3) and (4).

## 5. Design and planning of plant, buildings and structures

Any person designing and planning a plant, building or structure has a general ‘duty of care’ to ensure that the design and construction allows people to properly construct, maintain, repair, service or use the plant, building or structure in a safe manner.

The aim of this ‘duty of care’ obligation is to ensure that designers and builders of buildings and structures or designers, manufacturers, importers or suppliers of plant eliminate completely or significantly reduce risks before they actually reach the workplace.

This ‘duty of care’ also extends to any person who may be involved in the modification, renovation, maintenance or normal operation of a plant, building, structure or plant.

Therefore, at the design and planning stage, it is important to give consideration to prevention of falls systems, not only for use during the construction stage, but also for use during the maintenance of the plant, building or structure.

To ensure that risks to safety and health are considered fully during the design and planning process, designers or architects should:

- identify hazards associated with the design of the plant, building or structure that may arise while it is constructed and maintained, to which a person at the workplace is likely to be exposed;
- assess the risk of injury or harm to a person resulting from the hazards arising as a result of the design; and
- consider the means by which the risk may be reduced.

### 5.1 Plant (machinery, equipment and vehicles)

Designers, manufacturers, importers or suppliers of plant must eliminate or significantly reduce risks before they actually reach the workplace. Thoughtful design of plant can eliminate risks of falls from heights from the beginning.

The definition of ‘plant’ in the Act includes any machinery, equipment, appliance, implement or tool and any components or fittings of the plant. Therefore, the duty of care obligations for the safe design and manufacture of plant apply to a wide range of items, including farm machinery, transport vehicles, overhead conveyor systems and port loaders.

The elimination or reduction of risks of falls from plant might include:

- providing adequate steps and hand rails on a transport vehicle;
- incorporating a fall injury prevention system in silos and overhead conveyors;
- ensuring workers who will be maintaining or cleaning the plant are able to do so safely; and
- considering the safety of passengers.

Careful manufacture can also ensure the plant is as safe as the designer intended it to be, thus significantly reducing the chances that people may be exposed to risks of falls.

Providing information on hazards and safe use of plant is vital. This can make users aware of any risks the designer has been unable to eliminate and ensure that users do not create any new risks of falls by not using the plant properly.

See Appendix 3  
Section 23 of the  
Act.

See Appendix 3  
Subsections 23(1)  
and 23(2) of the Act.

## 5.2 Buildings and structures

Designers or constructors of buildings or structures must ensure that workers who will be involved with the construction, use or subsequent maintenance work are not exposed to risks of falls. Therefore, at the design and planning stage, it is important to consider providing fall prevention systems as part of the building or structure.

A 'building or structure' is defined in the Regulations as any erection, edifice, wall, chimney, fence, bridge, dam, reservoir, wharf, jetty, or ship or other floating structure, and includes any part of any of these things.

As it is unlikely that all design work on larger projects will be carried out by one designer, liaison should occur between the builder and other designers so that the work can be coordinated to ensure the safe interaction of the different design aspects.

When risks remain in the design work, information must be included with the design to alert others to the risks. Providing information about safety issues is a key component to ensure proper, adequate and suitable design and installation.

### Design and planning checklist

Safety considerations for the design and planning stage include:

- designing safe access to or egress from any work area including the roof;
- providing permanent guard rails or edge protection (e.g. parapet walls);
- the use of temporary work platforms (e.g. scaffolds and elevating work platforms);
- the location, operation, servicing and replacement of plant and equipment;
- the provision of suitably located temporary and permanent anchorage points and struts with safety line attachment to hook harnesses and lanyards for the use of fall injury prevention system;
- safer building design with, for example:
  - low level mounting of roof vents;
  - location of air conditioning units and other roof mounted plant, such as satellite dishes, away from the edges of the building;
  - non-fragile material for the roof;
  - permanent safety mesh for fall protection; and
  - safer gutters, e.g. installing large volume gutters and downpipes and gutter boards (made of material strong enough to prevent persons falling) on large gutters, and locating gutters at ground level or away from the edges;
- specific safety requirements for workers doing subsequent installation, maintenance or repair work, for example:
  - people installing and maintaining antennae and satellite dishes;
  - contractors servicing air conditioning equipment on the roof;
  - people cleaning windows and gutters; and

- people repairing the roof or gutters;
- the pre-fabrication of structures on the ground before they are lifted into position; and
- assessment of how close construction plant will have to go to roads or overhead power lines.

### **Design and planning for the safety of construction workers**

The design and planning considerations for the construction stage include:

- reducing the risk for those working at heights, such as the installation of guard rails to perimeter structural members prior to erection;
- reducing the time spent working at heights by pre-fabricating modules on the ground, before lifting them into position;
- sequencing of the work to be performed at heights;
- the siting and condition of access roads, for example, to enable a crane to place building materials in the most appropriate and accessible location, rather than the materials being moved manually;
- preparation of the ground or floor below the work area. It should be compacted and level to support plant or equipment, such as cranes and scissor lifts;
- identification of underground services including drainage, for example, for the safe setting up of cranes;
- provision of permanent safety mesh;
- consideration of the use of purlin trolleys to stack and move roof sheeting across the roof structure during installation;
- safe and proper access to and egress from amenities;
- provision of first aid facilities and trained personnel where necessary; and
- the safety requirements for maintenance on the finished building, such as the location of and access to equipment and the movement of materials into the building.

See Appendix 3  
Section 23 of the  
Act.

## 6. Access to and egress from work areas

If people are required to work in areas where there is the risk of falling, employers must provide a safe method for people to get to and from and move around that work area. This should take into account the tools and equipment which people will be required to carry to, from and around the work area and areas where plant is being used.

### **Safe access, egress and movement around a work area checklist**

In providing safe access to and egress from and movement around a work area, the safety considerations include:

- the installation of fixed work platforms, walkways and stairways;
- the use of temporary work platforms such as:
  - scaffolds; and
  - crawl boards (however, these are not fall prevention systems and should only be used when alternative methods are not available);
- the installation of a fall injury prevention system;
- the frequency and number of people who may need to use the access to or egress from the work area. Supervision and regular inspection should also be considered;
- the location and space required for any plant, equipment or materials used or temporarily stored;
- the safety of work surfaces;
- the operation of plant by trained and competent operators who hold relevant certificates of competencies;
- the method of getting plant, equipment and materials to the work area;
- exposure of access ways to the weather (e.g. rain can make surfaces slippery and strong winds can cause loss of hand grip);
- the assessment of manual handling tasks, including considering the provision of mechanical lifting aids;
- the provision of adequate natural or artificial lighting to all access ways; and
- the clearance of obstructions so that persons are able to move easily to and from the workplace.

## 7. Edge protection

Edge protection (often referred to as a ‘guard rail system’) is used to reduce the risk of a person falling from one level to another.

Edge protection must be provided to the edge of a scaffold, fixed stair, landing, suspended slab, formwork or falsework at the workplace, where a person is at risk of falling two or more metres.

Edge protection or a fall injury prevention system must also be provided at any other edge at the workplace where a person could fall three metres or more, according to set requirements, which are listed in the following checklist.

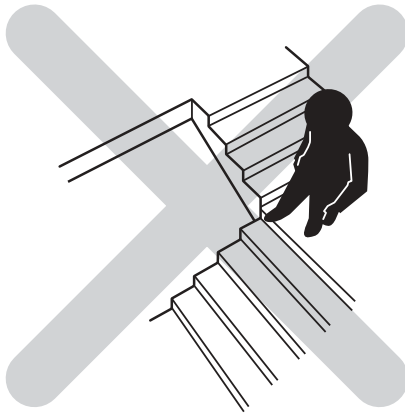
See also Section 8.7  
Scaffolding.

See Appendix 3  
Regulation 3.55.

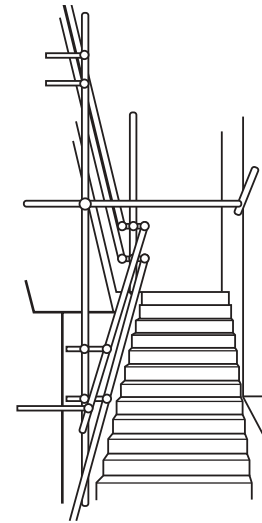
### Edge protection checklist

- the guard rail system must be constructed to withstand a force of 0.55 kN (approximately equivalent to 55kg) applied at any point of it. If edge protection is to be used on roofs with pitches exceeding 15° from the horizontal, the edge protection should be able to withstand the added impact forces;
- top rails must be between 900 mm and 1100 mm above the working surface;
- mid rails and toe boards must be provided. However, wire mesh infill panels incorporating a toe board may be used instead of the mid rail;
- a bottom rail above the toe board on some roof slopes may be provided for more severe roof slopes. Both a mid rail and infill mesh panel will assist in preventing persons and objects from sliding off the roof;
- the guard rails should comply with Australian Standard, *AS 1657 Fixed Platforms, Walkways, Stairways and Ladders – Design, Construction and Installation* and/or Australian/New Zealand Standard, *AS/NZS 4576 Guidelines for Scaffolding*;
- if access points are required for equipment (for example, a hoist), they should be protected adequately with gates, safety chains or any other means to prevent a person falling;
- where guard rail systems are intended to be used in conjunction with steel structures or tilt-up construction, designers and builders should plan for the guard rails and fixings to be attached to the panels prior to the structures being raised from the ground; and
- every open edge of a stair, landing, platform or shaft opening must be protected to prevent people falling.

**Below:** Unprotected stairways are a severe hazard.



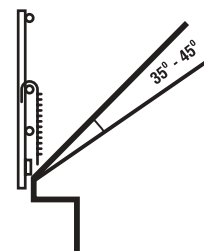
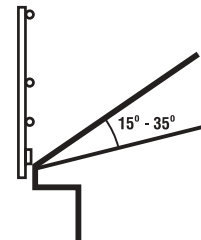
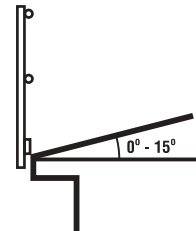
**Right:** Stairways must have handrails and toe (fender) boards on the landings and bagging fitted over the ends of tubing and over couplings.



### ***Different degrees of roof slopes***

With different degrees of roof slopes, the guard rail systems should incorporate the following:

- a top rail, mid rail and toe (fender) board, when roof slopes are between 0 degrees to 15 degrees from horizontal;
- a top rail, mid rail, bottom rail and toe board, when roof slopes are between 15 degrees and 35 degrees from horizontal. The bottom rail should be fitted midway between the mid rail and the roof;
- a top rail, mid rail, bottom rail, toe board and infill mesh panel to mid rail height, when roof slopes are between 35 degrees and 45 degrees. The infill mesh panel may assist in reducing injury to a person sliding down the roof into the railing and will minimise the possibility of objects falling from the roof. Where people are likely to be working below the edge of the roof at ground level, consideration should also be given to the use of infill mesh on roofs with flatter slopes; and
- where roof slopes exceed 45 degrees, the slope is unsuitable to work on without a support system, such as a fall-arrest/restraint system or a scaffold catch platform, to prevent injury.



## 8. Fall injury prevention systems and anchorages

### 8.1 An overview

'Fall injury prevention system' means a system designed to arrest a person's fall from one level to another and also minimise the risk of injuries or harm during the fall. 'Anchorage' means an anchorage point for a fall injury prevention system (i.e. the means for attaching a lanyard, lifeline or other components of the system to a secure point).

Fall injury prevention systems include:

- restraint systems;
- fall-arrest systems;
- catch platforms;
- scaffolding;
- safety nets; and
- safety mesh.

A fall injury prevention system must be used where a person could fall three metres or more from an edge at a workplace, unless edge protection complying with the Regulations is used.

See Appendix 3  
Regulation 3.48.

See Appendix 3  
Regulation 3.55.

#### Key points on the use of the fall injury prevention systems

- choosing the most appropriate fall injury prevention system is essential;
- the correct selection, installation and use of equipment is critical to their effectiveness when arresting a fall;
- the fall injury prevention system and the anchorages must be designed, manufactured, constructed, selected or installed so as to be capable of withstanding the force applied to them as a result of a person's fall;
- fall injury prevention systems should be such that a person falling travels the shortest possible distance before having the fall arrested;
- ensuring the lanyard and harness are actually connected to the fall injury prevention system is critical (rather than just wearing the equipment); and
- fall-arrest equipment must not be used after it has arrested a fall until it has been inspected and certified as operational by a competent person.

See Appendix 3  
Regulation 3.50.

The Australian/New Zealand Standard, AS/NZS 1891 series, *Industrial Fall-Arrest Systems and Devices* should be consulted for further information on fall-arrest systems.

Consideration should be given to slip resistance surfaces or coatings that render the surface trip or slip free to eliminate, where possible, any chance of a slip or trip or fall.

## **Marking of fall-arrest systems with instructions and other relevant information**

Relevant Australian/New Zealand Standards for personal fall-arrest and restraint equipment require that they be permanently marked or labelled to indicate their purpose, correct use and limitations together with other relevant information.

The aim of this marking and labelling is to reduce the incidence of misuse or misfitting of the equipment. It is important to maintain the legibility of these instructions through the life of the equipment.

## **8.2 Restraint systems**

A restraint system comprises:

- anchorage point(s);
- a static line or restraint line of appropriate strength and length; and
- a harness or restraint belt.

Its purpose is to limit horizontal movements from an anchorage point or a horizontal life line or life rail so that the user is totally restrained from reaching a position where either a free fall or limited free fall is possible.

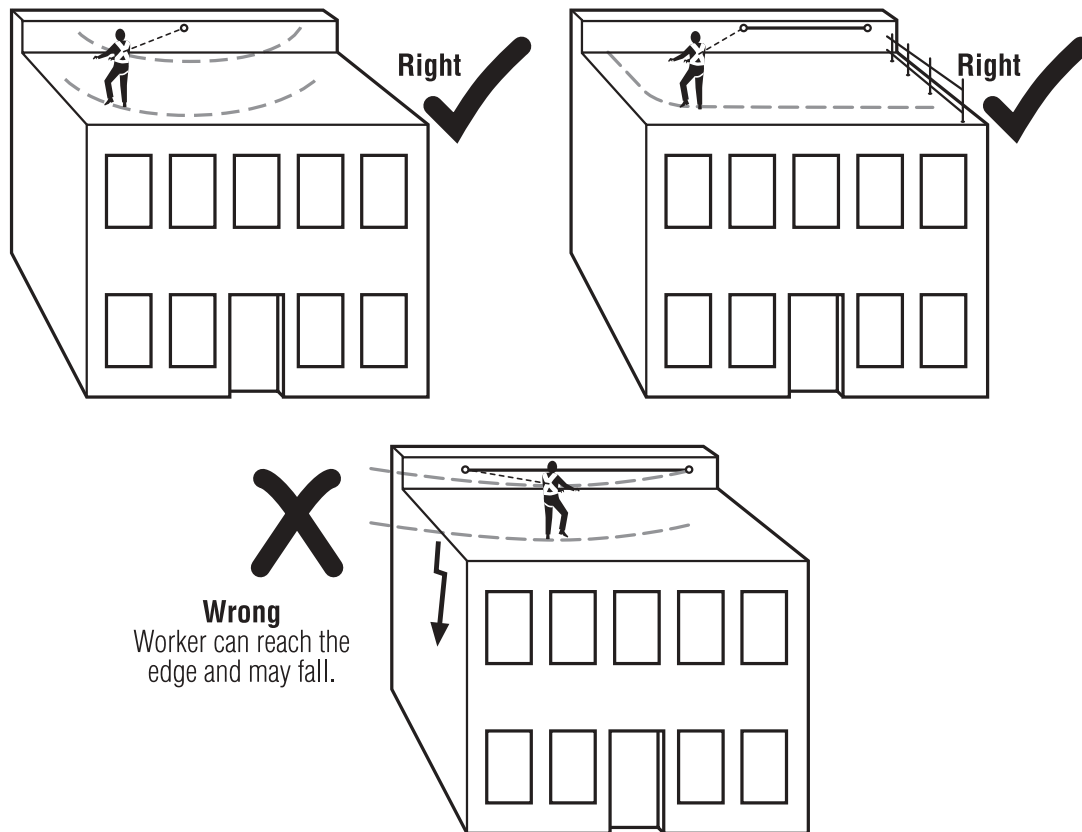
A restraint system is suitable for use where:

- the user can maintain secure footing without having to tension the restraint line and without the aid of any other hand hold or lateral support. When deciding whether secure footing can be maintained, consider:
  - the slope of the surface;
  - the supporting material type; and
  - the surface texture of the surface and whether it is likely to be wet, oily or otherwise slippery;
- the static lines are fitted with an industrial shock absorber when required; and
- the restraint system conforms with the Australian/New Zealand Standard, *AS/NZS 1891* series.

### **Use of a fall-arrest system *instead of* a restraint system**

A fall-arrest system should be used instead of a restraint system if any of the following situations apply:

- the user can reach a position where a fall is possible;
- the user has a restraint line that can be adjusted in length so that a free fall position can be reached;
- there is a danger of the user falling through the surface (e.g. roofing material);
- the slope is over 15°; or
- there is any other reasonably likely misuse of the system which could lead to a free fall.



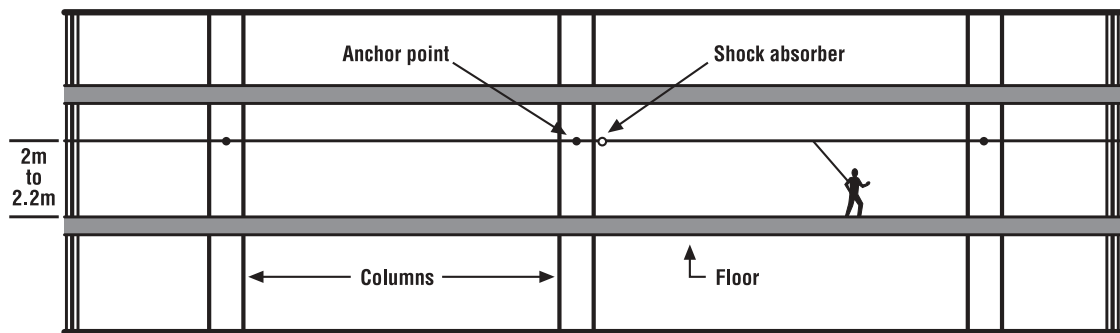
**Above:** Top two diagrams show acceptable use of a restraint system. Bottom diagram shows unacceptable use of a restraint system.

### 8.3 Fall-arrest systems

Individual fall-arrest systems are designed to arrest an accidental fall and consist of some or all of the following:

- anchorages;
- lifelines;
- inertia reel;
- lanyard that will not allow a person to fall more than two metres;
- retractable lifelines;
- rope grabs;
- wire grabs;
- rail system;
- shock absorbers – both personal and industrial;
- harness;
- snap hooks (double or triple action to prevent rollout);
- karabiners (double or triple action to prevent rollout); and
- rescue equipment.

See Appendix 5 and Appendix 6 for more details on fall-arrest systems.



**Above:** Fixed static line fitted with a shock absorber for use with safety harnesses and lanyards.

### Fall-arrest system installation checklist

When planning the site layout and sequence of construction for installing a static safety line system, the safety considerations include:

- selection of the most appropriate fall-arrest system and method of installation;
- the system conforms with the Australian/New Zealand Standard, AS/NZS 1891 series;
- provision of anchorage points (see Appendix 6 for details of static lines capable of supporting imposed loads);
- the requirements for lateral and vertical mobility whilst a person is connected to the system and working;
- the potential for different types of falls (e.g. free fall and restrained fall);
- fall distances and clearances (both vertically and laterally);
- provision of safe access to and egress from a work area for persons installing anchorage points;
- installation in a location where it will be possible to assist or rescue a person; and
- development of emergency rescue procedures before setting up and ensuring appropriate emergency equipment is available on-site, including a self-rescue kit if training in use has been provided, although these should not be relied on as the main means of rescue.

### Safe access to and egress from the work area

Before work commences, the employer or person who has control of a workplace and employees should ensure that there is safe access to and egress from the work area. This includes:

- assessment of wind and weather;
- organising of:
  - fall prevention equipment;
  - access;
  - personal protective equipment;
  - specific instructions for workers; and

Fall-arrest and industrial rope access systems should be only installed where it is possible to provide prompt assistance or rescue if required.

See Section 20 Emergency Rescue Procedures.

- means of rescuing persons from safety harnesses following arrested falls;
- and
- provision of a safe means of access to an anchorage point. This should take into account the possibility of a fall prior to the operator connecting securely to the anchorage and after disconnection at the conclusion of the task.

A person using a fall-arrest or industrial rope access system should not work alone.

## **Signage**

Signage should be in place permanently at entry points of static line systems to advise users on the fall prevention system and inspection details.

The signage should include statements on:

- the system it has been designed for (e.g. a restraint system or a fall-arrest system);
- how many people should use the system at any one time;
- any personal protective clothing and equipment the operator should wear;
- the date of the last inspection;
- the date of the next inspection; and
- the name of the person doing the inspections.

## **8.4 Inspection of fall injury prevention systems**

Users of fall injury prevention systems must be aware that fall prevention depends upon the continued efficiency and durability of fall injury prevention systems.

It is essential that all equipment is correctly maintained, with inspections and examination of all components by a competent person at regular intervals.

All fall injury prevention system equipment should have an established inspection regime for an effective inspection by a competent person. The following checklist provides information on inspection regimes.

### **Inspection of fall injury prevention systems checklist**

The safety requirements and considerations include:

- the inspection regime should include details of:
  - the equipment to be inspected (including its unique identification);
  - the frequency and type of inspection (pre-use checks, detailed inspections and, where appropriate, interim inspections);
  - designated competent peoples to carry out inspections;
  - action to be taken on finding defective equipment;
  - means of recording the inspections;

See Appendix 3  
Regulation 3.51.

See page i for  
a definition of a  
competent person.

See Appendix 3  
Regulation 3.51.

If a fall injury prevention system has been used to arrest a fall, it must be withdrawn from service immediately and inspected by a competent person.

See Appendix 3  
Regulation 3.53.

- training of users; and
- the system of monitoring the inspection regime to verify that inspections are carried out appropriately.

Employers should consult the manufacturer and/or supplier of the equipment for any product-specific requirements.

- the employer must ensure that each component of the system and its means of attachment to an anchorage is inspected by a competent person:
  - after it is installed but before it is used;
  - at regular intervals; and
  - immediately after it has been used to arrest a fall.
- if any signs of wear or weakness are found during the inspection, the employer must ensure that the components or means of attachment are withdrawn from use until they are replaced with properly functioning components. The manufacturer's specifications for inspections should also be checked for their recommendations on inspection intervals;
- all safety belts and harnesses, which are not in regular use during any six month period, are inspected before use;
- the fall prevention systems are inspected at least once every 12 months **and** after any extended storage period;
- consideration is given to environmental factors that may have affected the condition of equipment, such as water, oil, grease, sharp edges and grit; and
- there is consultation with the manufacturer if there is any doubt that a belt or harness could be affected by cleaning materials, atmospheric contaminants or hazardous substances.

### ***Inspection of anchorages***

Employers must ensure that a permanently fixed anchorage is inspected by a competent person and it is regularly inspected, at not less than six month intervals, if it is permanently fixed and in regular use.

If a permanently fixed anchorage is not in regular use, it must be inspected before it is used.

When the competent person doing an inspection assesses the anchorage as being impaired, the employer must ensure that:

- the anchorage is not used and is tagged to indicate it is not to be used; and
- the repaired anchorage is not used until it is inspected by a competent person who can confirm that it is safe to use.

All anchorages should be visibly checked prior to use.

## **Inspections for faults and condition**

### **Inspections of inertia reels checklist**

Inspections of inertia reels by the competent person should include inspecting:

- the rope or webbing including anchorage lines in Type 2/3 fall-arrest device (for example, inspecting for any defects or damage and checking the anchorage);
- the fall-arrest device body (for example, inspecting for any damage to the mounting ring or the body, checking the activation of the fall-arrest indicator and that labels are present);
- the locking mechanisms and rope guides (for example, inspecting the visible rope guides for excessive wear and checking that the rope runs freely through the anchorage and that the locking mechanisms work properly);
- the hardware (for example, checking that the snap hooks or links work properly); and
- the snap hooks and double or triple action karabiners (for example, inspecting for any damage and checking the movement of the latch).

### **Inspection of harnesses checklist**

The inspection of the harnesses by the competent person should include inspecting:

- the webbing (for example, inspecting for any damage or defects);
- the D rings (for example, inspecting for any damages or wear and tear and checking the vertical movement); and
- the buckles and adjusters (for example, inspecting for any damage).

The inspection checklist for possible faults and the condition of fall-arrest devices, belts and harness in the Australian/New Zealand Standard, *AS/NZS 1891.4* should be consulted, as well as the inspection checklist for static lines and anchorages in Australian/New Zealand Standard, *AS/NZS 1891.2 Supp 1*.

## **Inspections before work starts**

### **Before starting work**

Items in the fall injury prevention system to inspect or check before work starts include:

- ensure that the harness attachment point for the lanyards is the correct one, i.e:
  - the fall-arrest lanyards are attached to a D ring at the back between the shoulder blades;
  - fall-restraint lanyards are attached at hip level; and
  - lifeline lanyards or rope grabs are attached to a D ring at the chest.

Note that some harness attachment points may not be rated for fall-arrest;

- if a lifeline is being used with a rope grab, ensure that the rope and all rope grabs are compatible,

See also Appendix 6  
Components of fall-  
arrest and restraint  
systems.

especially with regard to rope diameter and direction;

- when setting up the fall-arrest equipment, inspect it for sharp edges, pinch points and sources of heat, which could wear, cut or burn through the lanyard if a worker should fall and be left dangling;
- ensure an emergency rescue procedure is in place;
- ensure that there is always assistance from another person when the fall-arrest equipment is in use. People who are working at a height or an elevated position should not work alone. This is important if there is a risk of a fall;
- ensure that there is no climbing above the anchorage point of a fall-arrest lanyard since the falling distance could double;
- ensure that fall-restraint components are not mixed with fall-arrest components. Fall-arrest components must incorporate a shock absorber;
- do not allow fall-restraint anchorage points, which have a much lower strength requirement, to be confused with fall-arrest anchorage points. Attach signs at each anchorage point indicating the type of anchorage point (i.e. whether it is for fall-restraint or fall-arrest);
- always inspect the snap hook visually after attaching it to a harness or anchorage point; merely hearing it click is not enough. There have been fatal accidents in which it was later found that the connector had not been closed properly;
- always set up the attachment point for fall-arrest or fall-restraint between the safe access point and the hazard. If a worker has to walk past the hazard to reach the attachment point, the purpose of the whole fall-arrest system is defeated; and
- always inspect all fall prevention equipment and hardware before use and, if there any doubts about the equipment, it should not be used because the boundary between safe and unsafe equipment is not well-defined. If the item is damaged, it must be taken out of service and inspected by a competent person prior to re-use.

## ***Welding and the protection of fall injury prevention systems***

A large part of the equipment and components of fall injury prevention systems consists of material which may be badly damaged and weakened by hot particles or sparks from welding or any allied process. Therefore, people using the system and the system itself must be protected from hot particles or sparks with, for example, fire retardant harnesses and lanyards, lanyards with a cable wire core or fire retardant blankets.

## **8.5 Hazards with the use of fall-arrest systems**

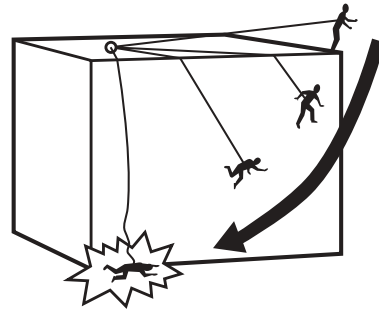
### ***Pendulum effect***

With the use of a fall-arrest system, a potential hazard is that, in some situations, the worker may swing onto the ground (which is called 'swing down') or swing back into the building (which is called 'swing back'). These hazards are caused by two lines offsetting one another, i.e. the line from the anchorage point to the worker and the line (direction) of the fall.

Both swing down or swing back can also occur within the interior of a roof.

## Swing down

With the hazard of swing down, the fall arrest line extends diagonally from the anchor point, following the perimeter edge of the roof. If the worker falls, the fall arrest line will slide back along the perimeter until it is at a right angle with the edge of the roof. When this happens, the worker will drop and may hit the ground (see diagram right) or the arrest line may break when contacting the edge of the roof and the worker will fall to the ground.



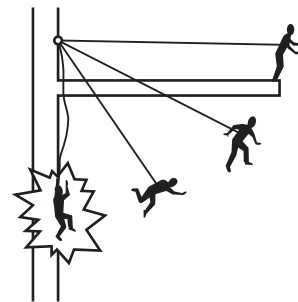
Consideration should be given to the following measures to address the hazard of swing down:

- install guardrails;
- put the anchorage point at a right angle to the position of the line at the perimeter edge. The use of a mobile anchorage will assist; or
- install a second anchorage point and belay devices, which are intermediate anchorages.

## Swing back

With the hazard of swing back, in a fall, particularly from a perpendicular edge, the worker will swing back into the building structure and collide with any obstructions in the path of the swing (see diagram right).

If there is a risk of swing back occurring, then the use of an individual fall-arrest should be reassessed.



## Assistance of another person

People who are working at a height or an elevated position should not work alone. This is important if there is the risk of a fall. A person suspended in a full body harness must be rescued as soon as possible.

Workers must be trained in rescue techniques and be familiar with on-site rescue equipment and emergency rescue procedures.

## Suspension trauma

Suspension trauma may occur when a person has an arrested fall because they are suspended and caught in an upright position. Section 20.1.1 has more information on suspension trauma.

## 8.6 Catch platforms (fans)

A catch platform is a temporary platform located below a work area. It may be constructed of scaffolding components.

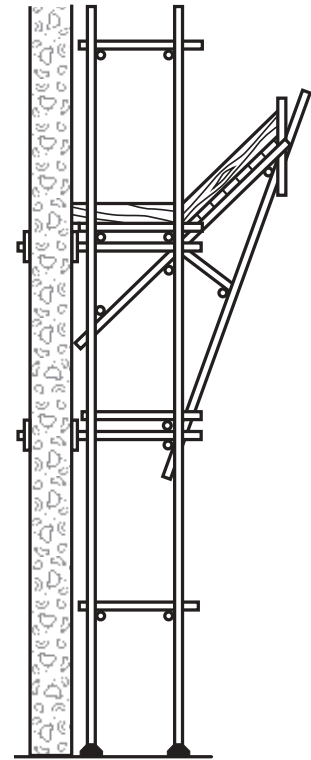
Catch platforms must be solidly constructed and designed to withstand the maximum potential impact load.

Consider the 'pendulum effect' before deciding on location of anchorage points.

For information on other hazards with fall-arrest systems, see Appendix 6 Components of fall-arrest and restraint systems.

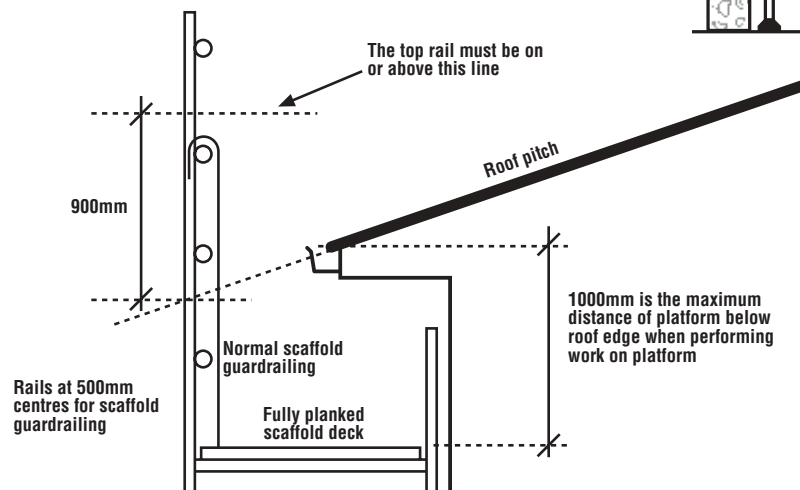
When scaffolding components are used, the catch platform should:

- have a deck that is fully planked out and is as close as possible to the work level;
- be no more than two metres below the work area;
- extend a minimum of two metres beyond all unprotected edges of the work area; and
- at a minimum, be the width of the area being removed (e.g. in roof laying work).



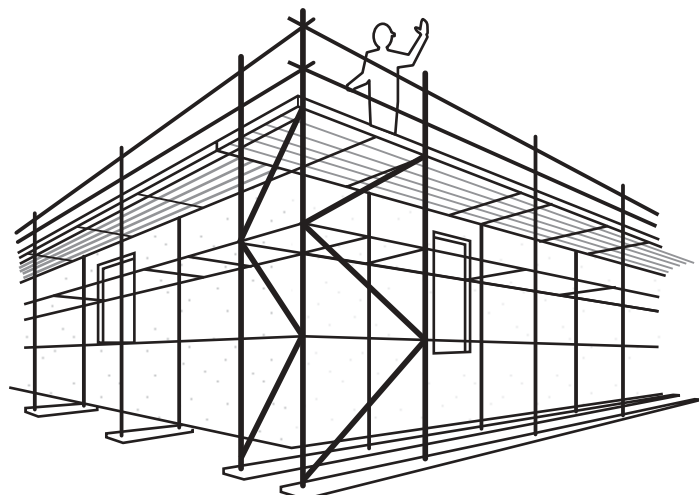
**Right:** An example of a catch platform below a work area.

**Below:** Example of a combination of work platform and catch platform for roof pitch of 26° or less.



## 8.7 Scaffolding

**Right:** Perimeter scaffolding with a fully decked working platform, guard rails and toe boards.



Scaffolding can be very effective protection in preventing falls; however, there are specific requirements that apply to the design, construction and erection of scaffolding.

The Australian/New Zealand Standard, *AS/NZS 4576* and the *AS/NZS 1576* series on scaffolding provide practical guidance on training, safe work practices, inspection and use of scaffolding and scaffolding equipment.

*AS/NZS 4576* is an approved code of practice under the Act.

### **Different duties for scaffolding**

Scaffolding work platforms are generally rated as light, medium or heavy duty.

'Light duty scaffolding' is scaffolding of up to 225 kg per bay. This is suitable for plastering, painting, electrical work and other light tasks. Platforms must be at least two planks (450 mm) wide.

'Medium duty scaffolding' is scaffolding of up to 450 kg per bay. This is suitable for carpentry and most other general trades work. Platforms should be at least four planks (900 mm) wide.

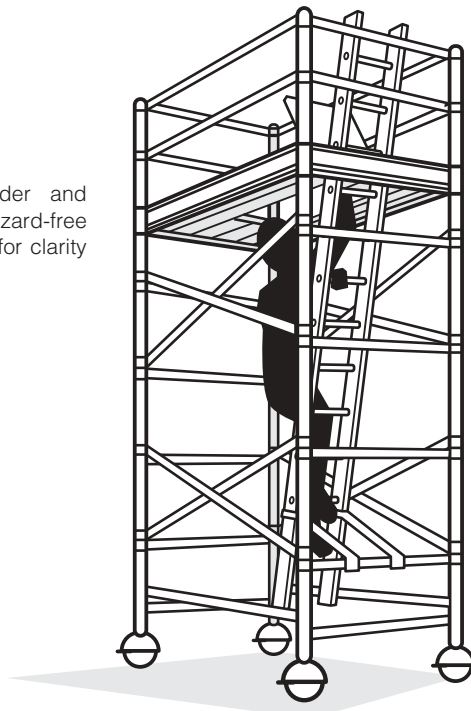
'Heavy duty scaffolding' is scaffolding of up to 675 kg per bay. This is needed for bricklaying, concreting, demolition and most work tasks involving heavy loads or heavy impact forces. Platforms should be at least five planks (approximately 1100 mm) wide.

### **Scaffolding checklist**

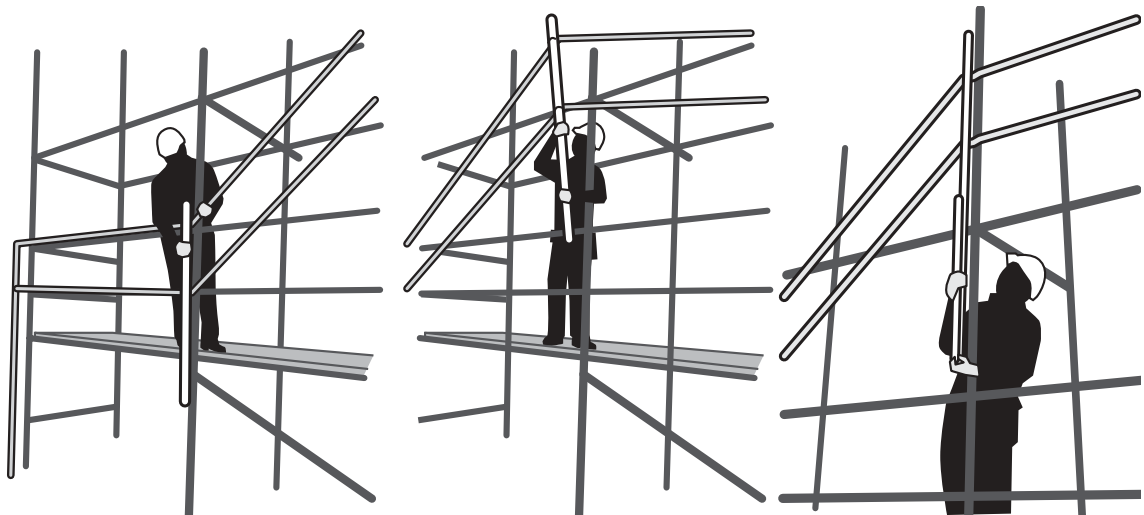
The safety requirements and considerations include:

- scaffolding must conform to Australian/New Zealand, *AS/NZS 4576* and the *AS/NZS 1576* series;
- if scaffolding is to be erected or dismantled at a height exceeding four metres, the scaffolding must be erected or dismantled by a certified scaffolder;
- a person must not alter scaffolding without authority from the main contractor;
- modular scaffolds must be of the same type, not mixed components. Mixed components from different manufacturers have resulted in scaffold incompatibilities and failures, posing significant risks to persons using the scaffolding;
- mobile tower frame scaffolds can be used to provide safe working platforms;
- scaffolding that is incomplete and left unattended should have danger tags and warning signs attached at appropriate locations to prevent use;
- scaffolding exceeding four metres in height should be inspected and tagged by a competent person before use, after any alteration or repair, and at intervals not greater than 30 days;
- additional inspections should be carried out by a competent person following an occurrence such as a severe storm or earthquake;
- safe access to and egress from the scaffold must be provided ; and
- edge protection (guard rails and toe boards) must be provided at every open edge of a work platform. Meshing should be installed over access and egress points.

**Right:** Mobile scaffold, access ladder and trapdoor to provide the maximum size hazard-free working platform. Toe board not shown for clarity of diagram.

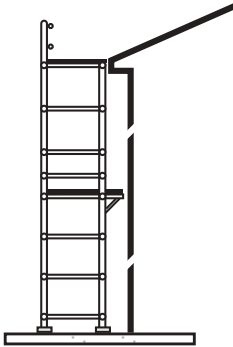


**Below:** Example of 'advanced edge protection' where guard railing is installed before the person goes up to the next level.

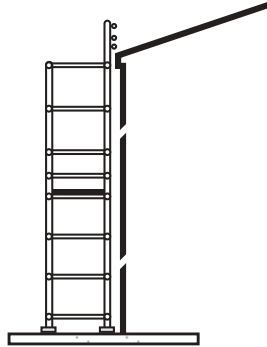


### Edges of a roof

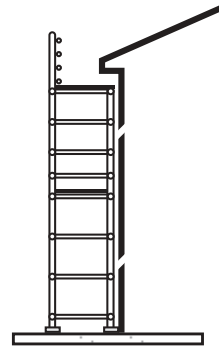
Scaffolding may be used as fall protection around the edge of a roof by incorporating guard railing as edge protection into the scaffolding. The following diagrams show common examples of acceptable roof guard railing arrangements on scaffolding. The toe boards are not shown for clarity of diagrams.



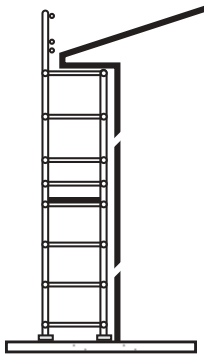
**Figure 1**  
Scaffold platform at edge of roof with hop-up bracket for other trades.



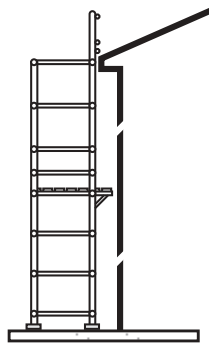
**Figure 2**  
Inside standards supporting guard railing.



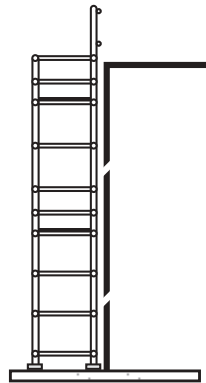
**Figure 3**  
Scaffold platform below edge of roof.



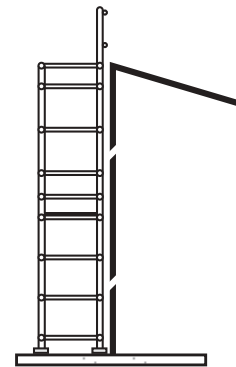
**Figure 4**  
Outside standards supporting guard railing.



**Figure 5**  
Inside standards supporting guard railing with hop-up bracket for other trades.



**Figure 6**  
Inside standards supporting guard railing adjacent to a flat roof structure.



**Figure 7**  
Inside standards supporting guard railing adjacent to a roof structure that slopes away from the top edge.

## 8.8 Safety nets

Safety nets can provide a satisfactory means of protection against fall injuries while allowing workers maximum flexibility of movement. They should not be used for access to or egress from a work area or as a working platform.

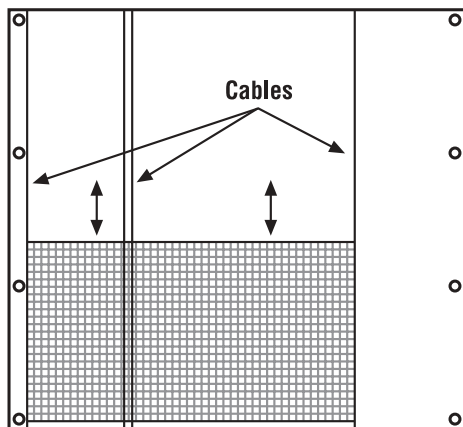
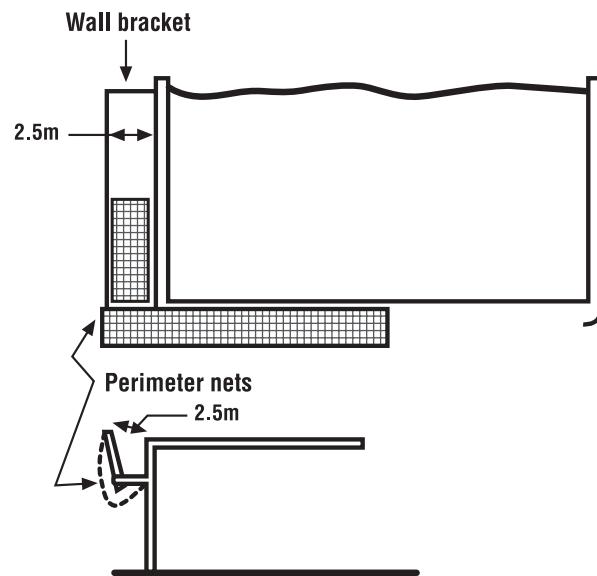
Information on safety nets is included in Australian/New Zealand Standard, *AS/NZS 4576 Guidelines for Scaffolding*. British Standards, *BSEN 1263.1-2002 Safety Nets: Safety Requirements, Test Methods and BSEN 1263-2:2002 Safety Nets: Safety Requirements for the Positioning Limits* also provide specifications for the safe use and installation of safety nets.

### Safety nets checklist

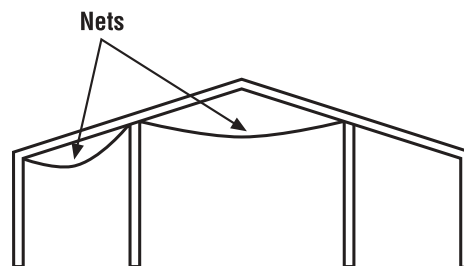
Where safety nets are used as a fall injury prevention system, employers should ensure that:

- safety nets are in position before any work is commenced;
- safety nets are constructed of material of sufficient strength to catch a falling person or debris;
- safety nets are installed and maintained by a certificated rigger or scaffolder;
- elevating work platforms (e.g. a cherry picker or scissor lift) are used for the installation. If this is not possible, scaffolding and fall-arrest systems should be used;
- safety nets are hung as close as is practicable to the underside of the working area, but no more than two metres below the working area;
- perimeter safety nets extend at least 2.5 metres beyond the leading edge of the working area (see the diagrams on the next page);
- perimeter safety nets are installed where there is no edge protection to prevent workers falling over the edges;
- where cables are installed along the length of the building or structure, safety nets are hung across these cables and moved along as the work proceeds;
- the safety net has sufficient tension and clearance to prevent a falling person contacting any surface or structure below the net;
- combustible material is not allowed to accumulate in suspended safety nets;
- no welding or oxy cutting is performed above safety nets;
- safety nets are not used in an environment that exposes them to damage from chemicals, sun or heat;
- safety nets are inspected, particularly after installation, relocation or repair; and
- the safety nets are stored correctly in dry, shaded areas. Good air circulation is also necessary.

Safety nets should not be used for access to or egress from a work area or as a working platform.



**Safety nets** - Plan view



**Safety nets** - End view

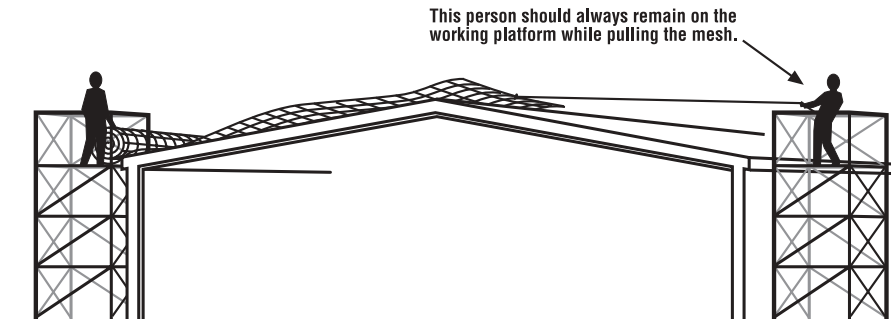
## 8.9 Safety mesh

Galvanised safety mesh securely fixed provides fall injury protection for roof installers and offers long-term protection for maintenance and repair workers.

The removal of roofing materials and safety mesh for the replacement of the roof or for demolition must be carried out in the reverse sequence to the way it was constructed initially. This means that:

- the sheeting should be removed first so that the safety mesh remains intact to provide maximum protection for the removal workers; and
- then the safety mesh should be removed.

**Below:** Means of installing safety mesh across the roof, prior to fixing it in position. Rope is used to pull mesh across the roof purlins. Do not walk across open purlins to draw the mesh. Edge protection is not shown for clarity of diagram.



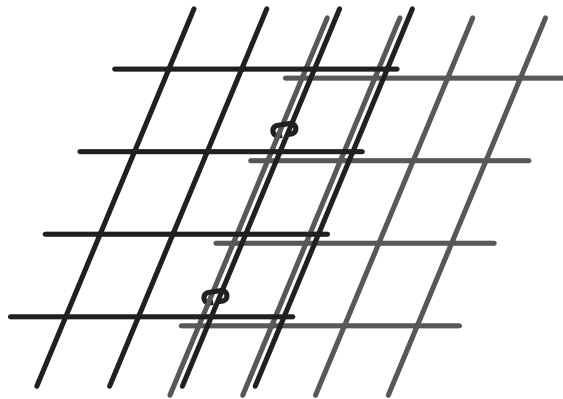
### Safety mesh checklist

The safety considerations include:

- safety mesh must be used in conjunction with appropriate guard rails or fall-arrest systems and devices when people are working close to open edges of a roof;
- the safety mesh should comprise 2 mm diameter wire of not less than 450MPa tensile strength welded into a mesh;
- the longitudinal wire spacing should not exceed 150 mm and cross wire spacing should not exceed 300 mm;
- safety mesh should be installed by a competent person;
- Australian/New Zealand Standard, *AS/NZS 4389 Safety Mesh* specifies the minimum requirements for the design, construction testing and installation of safety mesh in domestic, commercial and industrial building applications. Information is also contained in Australian Standard *AS 2424, Plastics Building Sheets - General Installation Requirements and Design of Roof Systems*, which is a superseded (but still available) Australian Standard;
- people engaged in the installation of safety mesh should be protected from falling by scaffolding (as in the diagram above), elevating work platforms and/or fall-arrest systems and devices;
- although not required when installation of safety mesh is carried out from properly erected scaffolding incorporating edge protection, fall-arrest equipment is required to access the roof span;
- installation of safety mesh and roofing material must be carried out in the correct sequence. Safety meshing must be completed and in place before roof sheets are moved into position. Consideration should be given to the use of purlin trolleys to move roof sheets into position where large areas are involved;
- a rope should be used to draw the mesh across the open purlins from one side to the other. Do not walk or jump across the open purlins to draw the mesh across the roof;
- the removal of roofing materials and safety mesh must be carried out in reverse sequence to the way it was constructed initially; and
- safety mesh should not be used for access to or egress from a work area or as a working platform.

## Joining of wires in the safety mesh

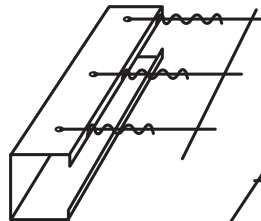
Adjacent runs of mesh must be overlapped one opening width.



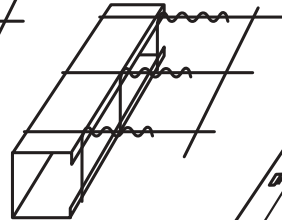
**Left:** Overlapping of adjacent runs of mesh by one opening width. Steel staples are required to fix runs of mesh where purlin spacing exceeds 1.7 metres.

**Below:** Means of fixing wire mesh to purlins, tied off with at least four full turns around the wire.

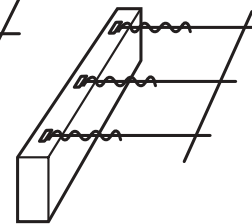
*Longitudinal wires passed through holes drilled in steel purlins*



*Longitudinal wires wrapped around steel or timber purlins*



*Longitudinal wires passed through steel staples on timber purlins*



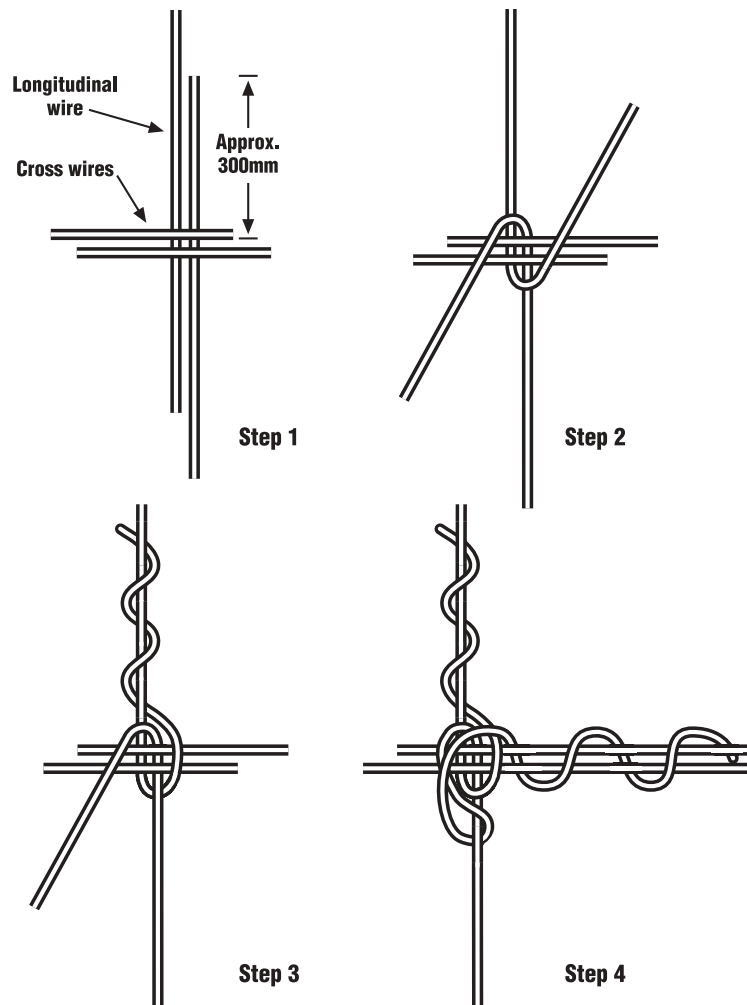
## Longitudinal wires

The joining of longitudinal wires must be done in a way that develops the strength of the connection of longitudinal wires to roof members.

If it is necessary to make longitudinal joins, the knot and tie should be the full length of the tail wire, which should be 300 mm in length.

The first tail wire should be tied at least three times around the knot.

The other tail wire is placed under the longitudinal wire and tied around the transverse wire. To get a 300 mm tail wire, cut the longitudinal wire close to a join. The join should be the full width of the mesh, with every longitudinal wire joined. The diagrams on the next page illustrate the tying procedure.



**Above:** Method for joining longitudinal wires and cross wires (Steps 1-4).

Any variation to the recommended method of tying should be avoided.

### **Cross wires**

The runs of mesh should be side lapped by at least 150 mm (one opening width). If the purlin spacing exceeds 1.7 metres, the runs of mesh should be fixed with 2 mm steel staples or by tying or twitching at intermediate spacings. This is to prevent people falling through the meshed bays.

## 9. Ladders: portable and fixed

Many falls from heights result from the non-use of ladders, for example, where crates, stools or desks are used to access heights instead of properly setting up a ladder. However, each type of ladder has specific safety requirements and considerations.

### Portable ladders

*Extension or single ladders should be used as a means of access to or egress from a work area, not as a working platform.*

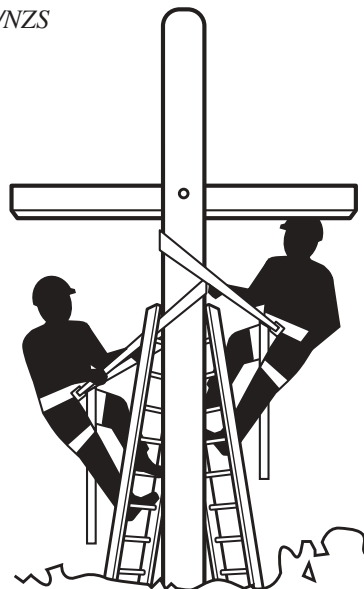
The Regulations set specific requirements for the use of a single or extension ladders, which are included in the checklist on the following pages.

In addition, the minimum recommended safe practices and requirements for the selection, safe use and care of portable ladders are set out in the Australian/New Zealand Standard, *AS/NZS 1892* series.

Other means of preventing falls may be necessary with the use of portable ladders, where a risk assessment determines additional protection will be needed. The additional means of protection include:

- use of a permanent or temporary fall-arrest system attached to a ladder where a person may fall three metres or more;
- use of pole straps (see the following diagram), which should be inspected regularly and at least daily when in use. Refer also to the relevant section in Australian/New Zealand Standard, *AS/NZS 1891.4*; or
- the installation of fixed ladders.

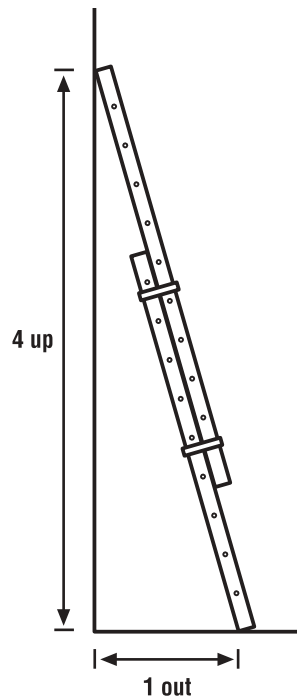
**Right:** An example of pole straps used with portable ladders to provide fall protection. In this situation, a secondary independent anchor point should be used (this is not shown in the diagram).



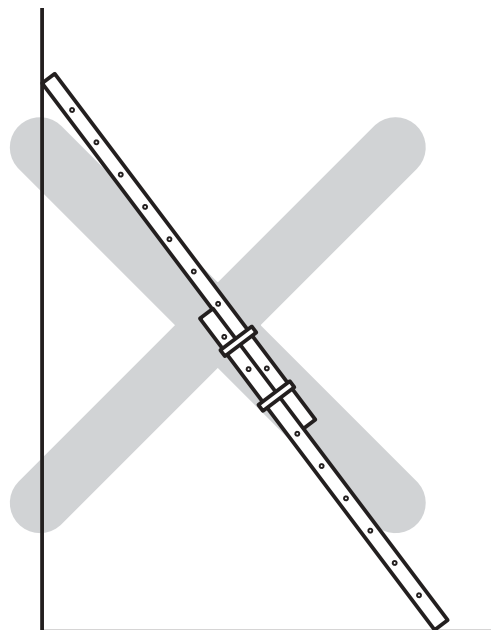
See Appendix 3  
Regulation 3.26.

For information on  
fall-arrest systems,  
see Section 8 and  
Appendix 6.

## Positioning of portable ladders



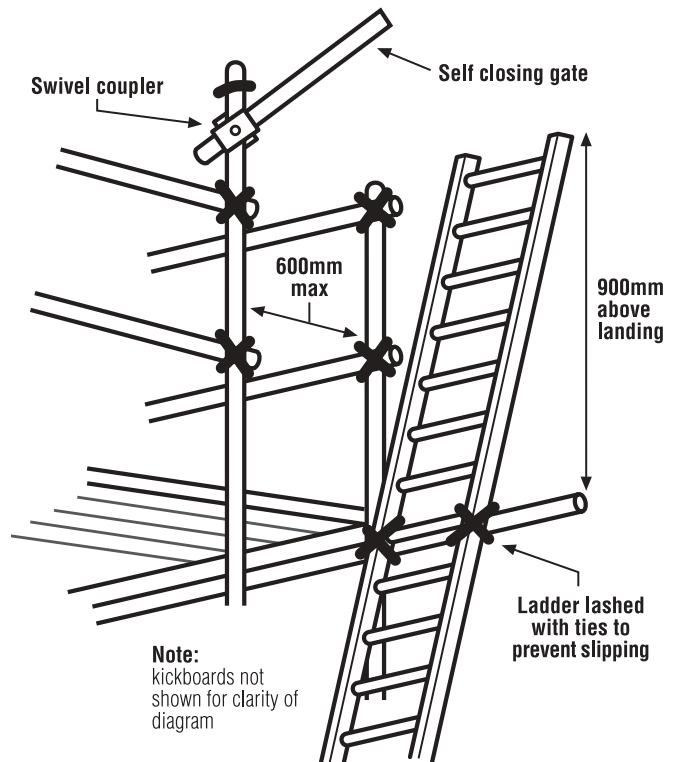
**Above:** The distance between the ladder base and the supporting structure should be about one metre for every four metres of working ladder height. Horizontal benching of ground ensures vertical alignment of ladder.



**Above:** Unsafe arrangement of ladder, which will create instability. Base of ladder positioned too far from wall. Sudden slipping can occur.

Always position the ladder so that **the rungs are at a right angle** to the edge of the working platform (i.e. the roof, scaffolding or gutter). The adjacent diagram illustrates this point.

**Right:** Position the ladder at a right angle to the edge of the working platform.



## Ladder checklist

If a ladder is used, check that:

- the type of ladder is appropriate to the task. Do not use 'domestic' or 'home-made' ladders. All ladders must comply with Australian Standard/New Zealand, *AS/NZS 1892* series and users should follow the manufacturer's recommendations on safe use;
- the ladder is in good condition. Before it is used, the ladder should be inspected for faults, such as broken rungs, rails and footing. Consult the manufacturer's checklist, if available;
- damaged ladders are removed from service;
- the ladder is on firm, stable and level ground;
- the ladder is the correct height for the task to avoid reaching or stretching. Keep the body centred between side rails at all times. Never over-reach;
- the ladder is not too close or too far from the support structure. The ratio must be one to four. For example, the distance between the ladder base and the supporting structure should be about one metre for every four metres of working ladder height. (See the diagrams on the previous page);
- the ladder is secured against displacement (i.e. slipping or sliding) and/or there is another person holding the base of the ladder;
- if used at a construction site, the ladder must not be suspended from a parapet hook;
- the ladder is not placed so that the weight of the ladder and any person using the ladder is supported by the rungs. (See the diagram on the next page);
- all the locking devices on the ladder are secure;
- the ladder is always faced while climbing up or down;
- materials or tools are not carried while climbing the ladder. Tools should be carried in a tool belt or side pouch;
- only light duty work is undertaken while on the ladder, where three points of contact can be maintained and tools can be operated safely with one hand;
- no person should stand on a ladder any higher than 900 mm from the top of the ladder;
- no other person is allowed on the ladder at the same time;
- slip resistant base, rungs or steps are provided;
- slip resistant shoes are worn;
- metal or wire bound ladders are never used close to energised power lines; non-metallic ladders should be used instead; and
- ladders are not used in access areas or next to doors when the work involves hot work, such as welding or oxy cutting, on scaffolding or an elevating work platform to get extra height, next to power lines, in very wet or windy conditions and next to traffic areas unless the working area is barricaded.

## Access or egress

Where fixed/extension ladders are used for access or egress, check that:

- they are used only for access to or egress from a working area, not as a working platform. Consider whether an elevating work platform or scaffolding would be safer;
- there is a firm and level work platform, free from obstructions, to step onto from the ladder;
- the ladder extends at least 900 mm above the stepping-off point on the working platform. Sufficient platform area must be provided at the stepping off point; and
- edge protection is provided at the stepping off point where people access the working platform.

## Working platforms

Where portable or fixed ladders are used as working platforms, check that:

- a fall-restraint or arrest system is used, if the person is exposed to a fall of three or more metres. Refer to *AS/NZS 1891.4* for anchorage requirements;
- **three points of contact with the ladder are maintained at all times.** This means that there should be *two feet and one hand* or *two feet and the frontal D ring on the harness attached to the fall-arrest/restraint line or inertia reel* (see the diagram below); and
- no work is carried out over another person. Ensure signage is used to warn people of work above.

See Example 1 in Appendix 4 for an example of a documented risk assessment of ladder use at a workplace.



**Above left:** Three points of contact with the ladder should be maintained at all times, i.e. two feet and one hand, two hands and one foot or two feet and the frontal D ring on the harness attached to the arrest/restraint line or inertia reel. Tools and materials should not be carried by hand. They should be in a tool belt or side pouch.

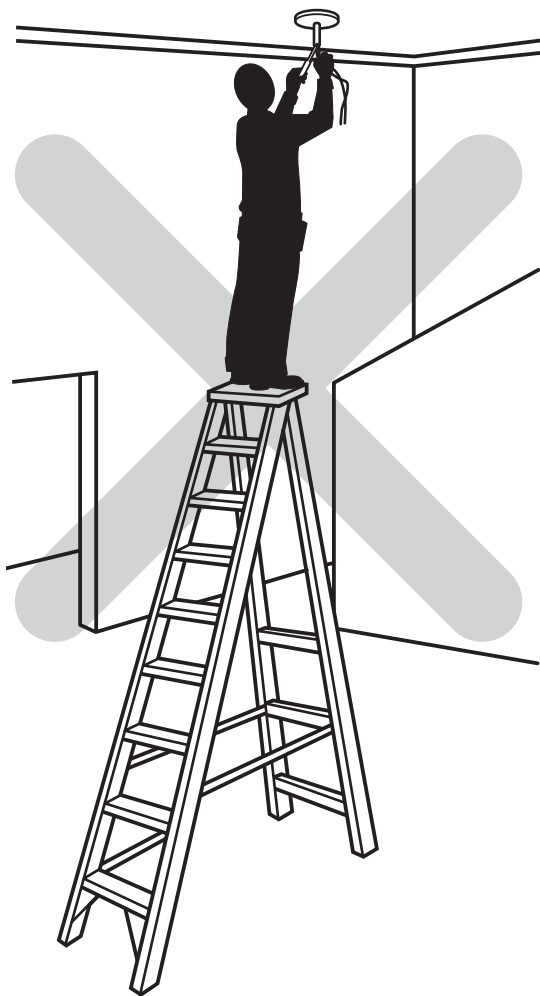
**Above right:** The ladder should not be placed so that the weight of the ladder and any person using the ladder is supported by the rungs.

## Step and trestle ladders

Step and trestle ladders should be used only in the fully open position.

A step ladder may be used in the closed position by leaning against a support; however, care must be taken to ensure that the load is carried by the front stiles only.

Alternatives to trestle ladders should be considered. There is a wide variety of working platforms now available for use in all circumstances, including small scissor lifts, light duty aluminium mobile scaffolds, boom arms and modular scaffolding.



**Above:** A step platform can provide a stable work surface.

Trestle ladders must be used only for light duty work and the minimum width of the working platform should not be less than 450 mm. Work should not be performed on a trestle platform that is over two metres above ground level unless edge protection is incorporated.

## Ladder bracket scaffolds

Alternatives to ladder bracket scaffolds should be considered because there are safer means of accessing heights of two metres, such as light duty scaffolding and elevating work platforms (e.g. scissor lifts).

Ladder brackets must not be used for general construction work.

Ladder bracket scaffolds may be used only for very light work, where an alternative is not practicable, such as sign writing.

When ladder brackets are used, their use must be in accordance with clause 10.2.5 of Australian/New Zealand Standard, *AS/NZS 4576 Guidelines for Scaffolding*.

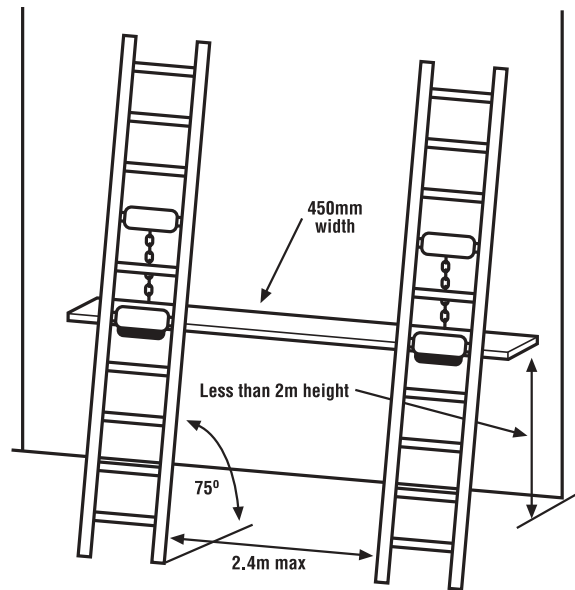
The platform on the brackets should be at least 450 mm wide (the minimum width of a light duty work platform).

**Right:** An example of unacceptable use of a ladder bracket – the working platform must only be used for work of two metres or less in height.

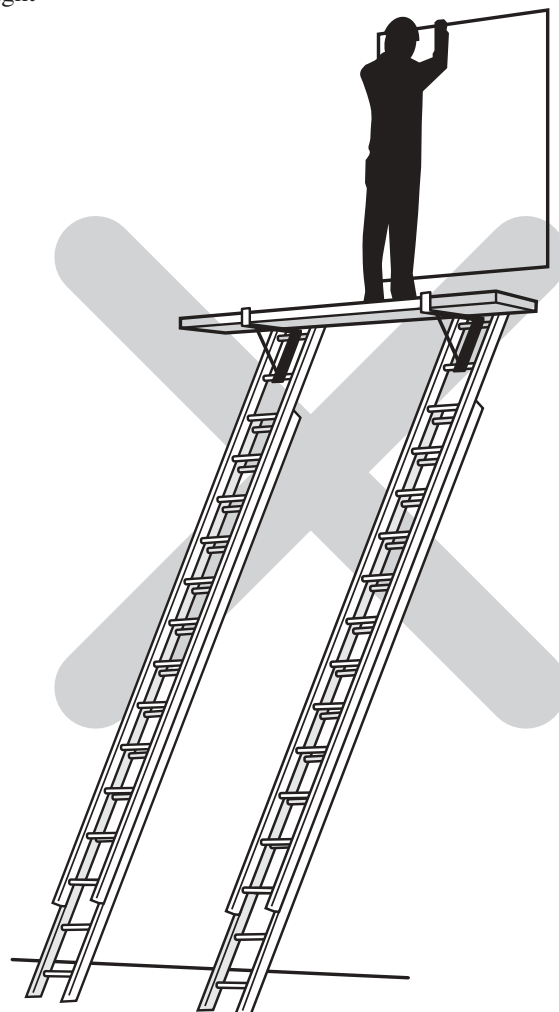
In this example, the brackets are mounted on the outside of the ladders. With the working platform required to be at least 450mm wide, the user would have to climb out over the working platform, without any hand hold points above the platform to support them while gaining access to the top of the working platform.

The leaning angle of the ladders is also greater than one in four (see the earlier diagrams under positioning of portable ladders) and the ladders may slip out at the bottom.

In addition, edge protection and a handrail must be provided if a person can fall two or more metres from the platform (see Regulation 3.55 in Appendix 3).



**Above:** Example of an acceptable ladder bracket scaffold.



## Fixed ladders

Ladder and tower safety systems should be installed on fixed ladders (for example, rung ladders). More information on these systems is provided below and on the next page.

The ladder cages in fixed ladders have been shown not to stop a fall but simply funnel a fall and, in some cases, more injuries can occur from striking the protective backguards on the way down and the cages may also hinder rescues. Therefore, fixed ladders with angles exceeding  $75^{\circ}$  to the horizontal should be fitted with a permanent or temporary fall-arrest system.

The ladder cages may also increase the risk of falling by giving the climber a false sense of security.

In areas where fixed ladders are installed, they should be in accordance with Australian Standard, *AS 1657 Fixed Platforms, Walkways, Stairways and Ladders - Design, Construction and Installation*.

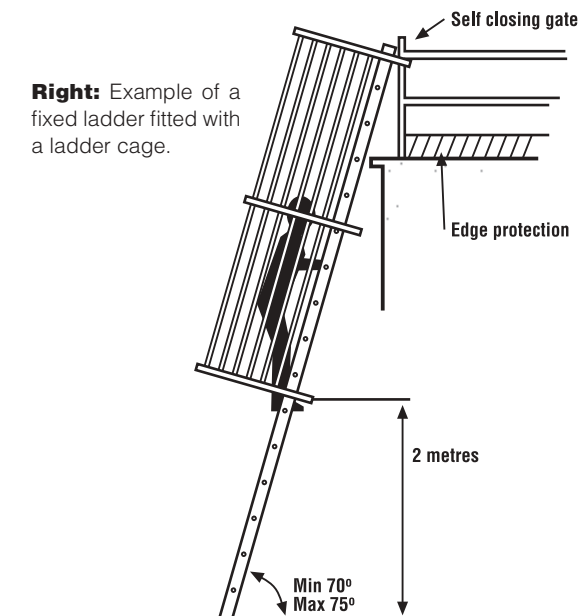
The angle of slope should not be less than  $70^{\circ}$  to the horizontal and not greater than  $75^{\circ}$  to the horizontal. **In no case should the ladder overhang the person climbing the ladder.** If the angle is more than  $75^{\circ}$ , a safe system of work to prevent falls should be provided such as a permanent fall-arrest system (see ladder and tower systems below) or a double lanyard harness (see the next page).

A specifically designed rescue procedure should be developed for use in ladder cage situations, in consultation with the safety and health representative, if any, and employees. Training in the rescue procedures should occur prior to the use of the fixed ladder.

## Ladder and tower safety systems

Ladder and tower safety systems are temporary or permanent fall-arrest systems, which can be installed to provide continuous fall protection for persons using ladders or climbing towers (see diagram opposite). These can be used on different types of plant, such as tower cranes, as well as buildings or structures.

**Right:** With the use of a ladder tower system, the person climbing has continuous fall protection by being attached to the anchorage by a drop line and harness.



Inertia reels may be used for providing fall protection on fixed ladders.











































































































































