Disclaimer

This publication may contain occupational health and safety and workers compensation information. It may include some of your obligations under the various legislations that WorkCover NSW administers. To ensure you comply with your legal obligations you must refer to the appropriate legislation.

Information on the latest laws can be checked by visiting the NSW legislation website (www.legislation.nsw.gov.au) or by contacting the free hotline service on 02 9321 3333.

This publication does not represent a comprehensive statement of the law as it applies to particular problems or to individuals or as a substitute for legal advice. You should seek independent legal advice if you need assistance on the application of the law to your situation.

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WHAT IS AN INDUSTRY CODE OF PRACTICE?

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

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

An industry code of practice is approved by the Minister for Commerce. It comes into effect on the day it is published in the NSW Government Gazette or on the day specified in the gazettal notice.

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

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

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

In summary an approved INDUSTRY CODE OF PRACTICE:

✔ gives practical guidance on how the required standard on health, safety and welfare can be achieved in an area of work

✔ should be followed, unless there is an alternative course of action which achieves the same or better standard of health and safety in the workplace

✔ can be used in support of the preventive enforcement provisions of the Act

✔ can be used to support prosecutions for failing to comply with or contravening the Act or Regulation.

PRELIMINARY

This industry code of practice has been produced by the WorkCover Authority of NSW to provide employers, self-employed persons and employees with practical advice on preventing injury to persons engaged in work on roofs.

This code of practice has been developed by a tri-partite industry working party and has involved extensive consultation with members of the construction industry, including specific industry sector representatives.
1 Introduction

1.1 Title

This is the Code of Practice: Safe Work on Roofs, Part 2 – Residential Buildings 2004.

1.2 Purpose

This code of practice sets out guidelines to prevent injury to persons engaged in work on roofs of residential buildings.

1.3 Scope

(a) this code of practice applies to the planning, preparation and conduct of work for the installation, maintenance and removal of roof coverings and the movement of persons working on roofs of residential buildings

(b) this code of practice does not apply to emergency service personnel, including the state emergency service, fire, police and ambulance personnel during emergency operations.

1.4 Commencement


1.5 Authority

This is an industry code of practice approved by the Minister for Commerce under section 43 of the Act on the recommendation of the WorkCover Authority.

1.6 Definitions

The following definitions are used for the purposes of this code of practice:


1.6.2 anchorage point – a secure point of attachment on a structure to which a fall arrest device or anchorage line may be secured.

1.6.3 anchorage line – a line that extends from a fixed anchor to which a person attaches their fall arrest equipment.

1.6.4 construction work means any of the following:

(a) excavation, including the excavation or filling of trenches, ditches, shafts, wells, tunnels and pier holes, and the use of caissons and cofferdams,

(b) building, including the construction (including the manufacturing of prefabricated elements of a building at the place of work concerned), alteration, renovation, repair, maintenance and demolition of all types of buildings,

(c) civil engineering, including the construction, structural alteration, repair, maintenance and demolition of, for example, airports, docks, harbours, inland waterways, dams, river and avalanche and sea defence works, roads and highways, railways, bridges and tunnels, viaducts, and works related to the provision of services such as communications, drainage,
sewerage, water and energy supplies.

1.6.5 **contractor** – the person responsible for the installation, maintenance, repair or removal of the roof coverings and any other operation involving the movement of persons working on roofs of residential buildings. Depending on the contractual arrangements which are in place, the contractor doing the work may be an employer, self-employed person or the principal contractor.

1.6.6 **employee** – an individual who works under a contract of employment or apprenticeship.

1.6.7 **employer** – a person who employs persons under contracts of employment or apprenticeship, and includes a self-employed person.

1.6.8 **energy absorber** – a component, whether separate or incorporated into another item, designed to be used in connection with fall arrest equipment which reduces the shock to the body and anchorage point by absorbing some of the fall energy.

1.6.9 **fall arrest device** – a self-locking device whose function is to arrest a fall. It can be either:

- type 1: a fall arrest device that travels along an anchorage line and, when loaded, locks to the line
- type 2: a fall arrest device from which a spring-loaded anchorage line pays out, and which locks when loaded.

1.6.10 **fall arrest harness (also known as safety harness)** – an assembly of interconnected shoulder and leg straps designed for attachment to a lanyard or fall arrest device.

1.6.11 **fall arrest system** – a system consisting of a fall arrest harness and other components connecting the harness to an anchor point to minimise the distance and severity of a fall.

1.6.12 **fall restraint** – a system that incorporates a safety line secured to an anchorage that prevents a person from reaching the edge of the roof or a defined opening within it.

1.6.13 **high risk construction work** – any of the following:

   (a) construction work involving structural alterations that require temporary support
   (b) construction work at a height above 3 metres
   (c) construction work involving excavation to a depth greater than 1.5 metres
   (d) demolition work for which a licence is not required under Chapter 10 of the Regulation to carry on the business of that work
   (e) construction work in tunnels
   (f) construction work involving the use of explosives
   (g) construction work near traffic or mobile plant
   (h) construction work in or around gas or electrical installations, and
   (i) construction work over, or adjacent to water where there is a risk of drowning.

1.6.14 **inertia reel** – a type 2 fall arrest device.

1.6.15 **infill panel** – a panel, typically fabricated from steel wire mesh, connected to the top rail of an edge protection system used in place of a midrail and bottom rail or toeboard. It can be either a structural panel, which does not require backing rails, or a non-structural panel, which does require backing rails.

1.6.16 **lanyard** – a flexible line, rope or strap, usually as part of a lanyard assembly, used to connect a fall arrest harness to an anchorage point or static line.

1.6.17 **lanyard assembly** – the combination of a lanyard and a personal energy absorber.
1.6.18 **must** – use of the term ‘must’ in this code of practice indicates that the requirements are mandatory under occupational health and safety legislation.

1.6.19 **principal contractor** – in relation to construction work (or a construction project involving construction work), means a person who is, under Clause 210 of the *Occupational Health and Safety Regulation 2001* for the time being appointed or taken to be the principal contractor for the construction work.

1.6.20 **the Regulation** – refers to the *Occupational Health and Safety Regulation 2001*.

1.6.21 **residential buildings** either:

   (a) Single dwelling-house, which means a dwelling used or adapted for use solely for habitation by not more than one family and includes a dwelling in a row of two or more dwellings attached to each other such as commonly known as semi-detached or terrace buildings, but does not include a flat.

   (b) Residential flat building, which means a building containing two or more dwellings.

1.6.22 **rope grab fall arrester** – an item that reduces the potential free fall distance and may absorb much of the energy of a fall while allowing mobility along the line. The rope grab fall arrester can be either manually moved along the line or locked in place, or it can be an automatic device.

1.6.23 **self-employed person** – a person who works for gain or reward otherwise than under a contract of employment or apprenticeship, whether or not they employ others.

1.6.24 **should** – indicates a recommendation to do something that is not a mandatory requirement under occupational health and safety legislation.

1.6.25 **site safety plan** – means the site specific occupational health and safety management plan referred to in clause 226 of the Regulation.

1.6.26 **static line (also known as horizontal lifeline)** – a substantially horizontal line in tension attached to two or more anchorage points to which a lanyard may be attached, and designed to arrest a fall.

1.6.27 **safe work method statement** – a statement that:

   (a) describes how work is to be carried out;

   (b) identifies the work activities assessed as having safety risks;

   (c) identifies the safety risks; and

   (d) describes the control measures that will be applied to the work activities, and includes a description of the equipment used in the work, the standards or codes to be complied with, the qualifications of the personnel doing the work and the training required to do the work.

### 1.7 Legal requirements for occupational health and safety

#### 1.7.1 Statutory provisions

The following Act and Regulation apply to work on roofs:

- the *Occupational Health and Safety Act 2000*
- the *Occupational Health and Safety Regulation 2001*.

#### 1.7.2 Employers’ responsibilities

Employers must ensure the health, safety and welfare of employees at work and that other people at the
workplace are not exposed to risks to their health or safety arising from the conduct of the employers’ undertaking.

1.7.3 Employees’ responsibilities
Employees must take reasonable care for the health and safety of other persons in the workplace and cooperate with their employer in the interests of health, safety and welfare. Employees must use the appropriate protective equipment provided by the employer while at work to enable compliance with any requirement.

1.7.4 Self-employed persons’ responsibilities
Self-employed persons must ensure that persons not in their employment are not exposed to risks to their health or safety arising from the conduct of the person’s undertaking while they are at the person’s place of work.

1.7.5 Responsibilities for construction work
Construction work has additional requirements in the Regulation for control and documentation, including the need for the appointment of a principal contractor in many instances, and the requirement for the provision of a site safety plan and safe work method statements.

1.7.6 Responsibilities of the principal contractor
Most activities associated with working on roofs are considered to be construction work. When construction work is being undertaken there are special provisions when the value of the project is more than $250,000 or when it is high-risk construction work. In both cases, a principal contractor must be appointed, and be capable of meeting their defined obligations. The responsibilities of the principal contractor are in addition to their responsibilities as an employer or self employed person and may include the provision of a site safety plan, safe work method statements, hazardous substances registers and the like. Refer to Chapter 8 of the Regulation for more information.

1.7.7 Responsibilities of designers, manufacturers and suppliers of plant and substances
Designers, manufacturers and suppliers of plant and substances for use at work must ensure that the plant or substance is safe and without risk to health when properly used and that adequate information is provided to the persons to whom it is supplied to ensure its safe use.

1.7.8 Other documents
The documents listed below are mentioned in this code of practice. Those marked † are referred to in the Regulation and must be complied with, while those marked ‡ are called up under the Act as an industry code of practice. Those unmarked have no legislative standing but reflect good practice. Readers should refer to them where necessary to ensure compliance with their regulatory obligations or to obtain advice in helping to establish a safe workplace.

• ‡ AS 1337 Eye protectors for industrial applications
• † AS 1418.7 Cranes (including hoists and winches) Part 7: Builders hoists and associated equipment
• † AS/NZS 1576 Scaffolding
• ‡ AS 1657 Fixed Platforms, walkways, stairways and ladders – Design construction and installation
• ‡ AS1891.1 *Industrial fall arrest systems and devices* Part 1: *Industrial safety belts and harnesses*

• ‡ AS/NZS 1891.2 *Industrial fall arrest systems and devices* Part 2: *Horizontal lifeline and rail systems*

• ‡ AS 1891.3 *Industrial fall arrest systems and devices* Part 3: *Fall arrest devices*

• ‡ AS 1891.4 *Industrial fall arrest systems and devices* Part 4: *Selection, use and maintenance*

• AS 1892.5 *Portable ladders* Part 5: *Selection, safe use and care*

• AS 2050 *Installation of roof tiles*

• AS 2210 *Occupational protective footwear*

• AS/NZS 4040.4 *Methods of testing sheet roof and wall cladding* Part 4: *Resistance to impact (sandbag) for sheet roof materials*

• AS/NZS 4200.2 *Pliable Building Membranes and Underlays: Installation requirements*

• AS/NZS 4389 *Safety Mesh*

• AS 4994.1 *Temporary roof edge protection* Part 1: *General requirements*

• AS 4994.2 *Temporary roof edge protection* Part 2: *Installation and dismantling*

• ‡ The NOHSC guide to the Control of Asbestos Hazards in Buildings and Structures

• NOHSC Australia Code of Practice for the Safe removal of Asbestos

• ‡ WorkCover Code of Practice Consultation

• ‡ WorkCover Code of Practice Electrical practices for construction work

• ‡ WorkCover Code of Practice Risk Assessment

• WorkCover Guide *Portable ladders*

• WorkCover Guide Your Guide to Working with Asbestos

• WorkCover Position Paper *Working off stepladders*
2 Consultation

The Act and the Regulation require employers to address workplace health and safety through a process of risk management and consultation.

To effectively implement this code, employers need to be aware of these requirements and have procedures in place to apply them.

Employers are advised to consult the Act and the Regulation as well as the Code of Practice: Occupational Health and Safety Consultation and the Code of Practice: Risk Assessment for details of these requirements and how they can be met. The following provides an overview of consultation requirements; risk assessment is covered throughout the other sections of this code.

2.1 Consultation at the workplace

Employers must consult with employees when taking steps to assess and control workplace risks.

In order to consult with employees, employers are required to set up consultation arrangements and develop consultation procedures.

2.1.1 Consultation arrangements

The Act provides three options for consultation arrangements:

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<tr>
<th>Arrangement</th>
<th>Workplace</th>
<th>Requirement</th>
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<tr>
<td>OHS committee</td>
<td>20 or more employees</td>
<td>requested by a majority of employees or direction by WorkCover</td>
</tr>
<tr>
<td>OHS representative</td>
<td>any size</td>
<td>at least one employee requests an election or directed by WorkCover</td>
</tr>
<tr>
<td>Other agreed arrangements</td>
<td>any size</td>
<td>agreed by both the employer and employees (in a small workplace it may be a regular safety meeting with employees)</td>
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</tbody>
</table>

Before using this Code, an employer should ensure that consultation arrangements are in place. An employer may initiate the establishment of an OHS committee or the election of an OHS representative if the employees have not made such a request. When the consultation arrangements have been decided, employers are required to record them and advise all existing and new employees.

2.1.2 Consultation procedures

After setting up the consultation arrangements, employers need to consider when and how these consultation arrangements need to be applied.
2.1.3 When should consultation be undertaken?

Under the Act, employers have the general duty to consult employees when decisions are being considered that may affect their health, safety and welfare at work. Therefore, employers are required to consult with their OHS committee, OHS representative or other agreed arrangement when such decisions are being considered. Decisions, which could affect health and safety include:

- planning for new premises or modifying existing premises
- purchasing new plant, equipment or substances
- planning, designing or changing work tasks or jobs
- using contractors in the workplace
- investigating incidents or accidents
- developing emergency procedures
- determining or reviewing workplace amenities
- determining or reviewing consultation arrangements
- assessing, reviewing and monitoring risks to health and safety from work
- eliminating or controlling risks to health and safety from work.

**Note:** Any procedures that are developed to encompass these activities should incorporate consultation.

It may not be practical or reasonable to involve the OHS committee or the OHS representative in every purchase decision or task change. However, the employers and committee or representative should agree on what process is needed to ensure that affected employees are consulted.

2.1.4 How should consultation be undertaken?

When engaged in consultation, the Act requires employers to:

(a) Share all relevant information with employees – for example, if an employer is going to change a work task, employees need to be told of any risk to health and safety that may arise and what will be done to eliminate or control these risks.

(b) Give employees reasonable time to express their views – employees need adequate time to assess the information given to them, obtain relevant safety information and consult with fellow employees to enable them to form their views.

(c) Value the views of employees and take them into account when the decision is made to resolve the matter – in many cases, agreement will be reached on how the safety issues are to be addressed. When agreement cannot be reached, the employer should explain how the employees’ concerns have been addressed.
3 Planning and preparation

Careful planning and preparation is the first essential step to ensure that work is done safely. Planning and preparation must involve consultation with all those engaged in the work, and include the risk assessment and control process.

3.1 Planning by designer

Architectural and engineering designs of roofs and roof framing should take into account whether the work practices necessary to carry out the installation and maintenance of the designs are safe.

Matters to be considered should include at least the following:

(a) the use of fall prevention equipment, such as guardrails or guardrail attachments at the perimeter, where appropriate

(b) measures to prevent falls through the roof, such as roof member spacing, safety mesh, fall prevention sarking and trafficable roof cladding

(c) providing anchorage points for a fall arrest system, where required for use during installation, subsequent work on the roof and maintenance. To determine where these are required see Appendix A of this code of practice

(d) the strength of roof members to which guardrails are attached or which act as an anchorage point for a fall arrest system

(e) the distribution of materials on the structure, and

(f) provisions to provide safe access to or through the roof space.

3.2 Planning by the principal contractor

A principal contractor must be appointed in the following circumstances:

(a) where the cost of the construction work is over $250,000

(b) where the work involves high risk construction work (this includes work at a height above 3 metres)

(c) demolition work or asbestos removal work for which a licence is required under Chapter 10 of the Regulation.

In the case of (a) the principal contractor must prepare and implement an OHS management plan in accordance with Clause 226 of the Regulation. The principal contractor must also ensure that each sub-contractor supplies a written safe work method statement for the work to be carried out by the subcontractor.

In cases (b) and (c) the principal contractor must ensure that each sub-contractor supplies a written safe work method statement for the work to be carried out by the sub-contractor.

In cases (a) and (b) if a principal contractor is not appointed the owner is taken to be the principal contractor and in case (c) the employer carrying out the work is taken to be the principal contractor.
Before roof operations start, the principal contractor, in consultation with the contractors doing the work, should undertake an assessment of the risks involved in carrying out the work (see 3.4 and 3.5) and should consider:

- the type and placement of scaffolding required for access and falls prevention
- the most effective methods of controlling the risk of falls and injury (see section 5)
- using building methods that reduce work at heights
- that the roof framing is complete and braced
- that the strength of the roof members is adequate to support the system to be used for controlling the risks of fall injury
- providing suitable and safe access to and from the construction site including the place of work
- placing roofing materials being delivered in the most favourable position at the site to access the roof
- electrical safety, including the location of nearby overhead power lines or electrical service cables and providing systems of work which comply with the recommendations in the WorkCover Code of Practice: Electrical Practices for Construction Work
- that all persons carrying out the work have received appropriate training and instruction (see section 11)
- that all contractors and sub contractors have been provided with the parts of the site safety management plan that are relevant to their work on the roof.

3.3 Planning by contractors

The contractors doing the work have a duty under the Act to provide and maintain a safe workplace that is without risk to the health of the workers and others at the workplace in relation to those matters over which he or she has control.

In addition to consultation with the principal contractor, the contractors doing the work must

(a) undertake an assessment of the risk involved in carrying out the work (see 3.4 and 3.5). This must include an assessment of all manual handling risks arising when carrying out the work

(b) determine the most effective methods of controlling the risk of falls and injury (see Sections 5, 6, 7 and 8)

(c) provide a written safe work method statement, describing how the work is to be done safely. This safe work method statement should take into account an assessment of the risk involved in carrying out the work

(d) provide suitable and safe access to and from the roof

(e) install roof edge protection, anchor points or other fall protection measures resulting from (b) above

(f) ensure all persons carrying out the work are provided with appropriate training and instruction (see Section 11).

The contractor should also consider:

- the placing of roofing materials in the most appropriate position to assist manual handling
- the distribution of materials or other equipment to avoid excessive point loading on the roof structure
- the duties of the crew – the more hazardous tasks should be allocated to persons with experience in the task in order to minimise the risks.
• the use of appropriate tools on the roof – the use of certain tools such as angle grinders should be limited

• electrical safety, including the location of nearby overhead power lines or electrical service cables and providing systems of work which comply with the recommendations of the WorkCover Code of Practice: Electrical Practices for Construction Work

• special health and safety issues if slippery, brittle or fragile roofing materials are encountered or the work involves removal of asbestos cement sheets

• the transferring of old roofing material from point of removal to the ground

• preventing persons entering the area below the roof where there is a danger they may be struck by falling objects.

3.4 Risk assessment and control measures

A hazard identification and risk assessment process must be carried out at the planning and preparation stage by the employer/contractors doing the work to determine what risks may arise when the work is being carried out. Safe systems of work must then be put in place to eliminate or control these risks. The safe system of work must be documented in the safe work method statement.

The process of risk assessment and control is made up of the following steps:

• identify the hazards

• assess the risk(s) from the hazards

• use appropriate control measures to eliminate or control the risk

• reviewing the control measures from time to time, to ensure their continued effectiveness.

3.5 Hierarchy of control measures

The Regulation prescribes the following hierarchy of controls that must be used when to eliminate or minimise a risk to health and safety in the workplace. Refer to Section 5 of this code of practice to see how this must be applied to working on residential roofs

1. eliminate the risk (eg. discontinue the activity or not use the plant)

2. minimise the risk by:
   • substituting the system of work or plant (with something safer)
   • isolating the hazard (eg. introduce a restricted work area),
   • introducing engineering controls (eg. guardrails or scaffolding)
   • adopting administrative controls, by example, safe work practices such as hazard warning signs (eg. ‘persons working above’, ‘nail gun in use’) and specific training and work instructions (eg. for brittle or fragile roofs) and
   • using personal protective equipment (PPE) (eg. fall arrest equipment, safety footwear, eye protection).

The control measures at level 1 give the best results and should be adopted where possible. The level 2 measures apply in descending order of effectiveness and require more frequent reviews of the hazards and systems of work. In some situations a combination of control measures may be used such as engineering means and PPE.
The risk control measures identified by the contractors must be incorporated in safe work method statements and supplied to the Principal Contractor who must include them in the OHS site management plan. (see Appendix B for a general safe working on roofs risk assessment checklist).

### 3.6 Preparation for work to commence

When preparing for the commencement of work all controls indicated by the site safety plan; safe work method statement(s); and the risk assessment(s) as applicable must have been put in place and that no new hazards exist, or have been created.

Preparation should include:

- an assessment of climatic/environmental conditions (e.g., moisture, lichen or dust on the roof, wind)
- fall prevention equipment (scaffolding, guardrails, fall prevention sarking, etc)
- access to and from the workplace including through edge protection systems
- PPE
- specific instructions for employees
- safety switches on portable electric powered tools
- emergency and rescue procedures in the event of an accident, injury or other emergency (including the means of rescuing persons from fall arrest harnesses following arrested falls), and
- allocation of dedicated area to erect and operate plant such as a tile elevator or builders hoist.
4 Access

The following is applicable:

- access to the work area and to the roof must be safe and without risks to health
- access requirements should take into account any tools and equipment the person may be required to carry to and from the roof
- if ladders are used for access:
  - the ladder should have non-slip feet and be secured against movement
  - persons should have a safe landing place when stepping off the ladder
  - the ladder should extend at least one metre above the landing place
  - the clearance between metal or wire reinforced ladders and any electrical conductor wires (powerlines) should be at least 3 metres. Otherwise non-conducting ladders should be used, and
  - it must not require the person to climb over the top guardrail.

For further information on the safe use of ladders, reference should be made to the WorkCover Guide *Portable ladders*, the Position Paper *Working off stepladders* and AS 1892.5 *Portable ladders – Part 5: Selection, safe use and care.*
5 Safeguards from working at heights

5.1 Legislative requirements

Clause 56(1)(a) of the Regulation requires that an employer must ensure that risks associated with falls from a height are controlled by use of one of the following measures, being the provision and maintenance of:

(i) a stable and securely fenced work platform (such as scaffolding or other form of portable work platform), or

(ii) if compliance with subparagraph (i) is not reasonably practicable – secure perimeter screens, fencing, handrails or other forms of physical barriers that are capable of preventing the fall of a person, or

(iii) if compliance with subparagraph (ii) is not reasonably practicable – other forms of physical restraints that are capable of arresting the fall of a person from a height of more than 2 metres.

Unlike many other areas of the Regulation, these control measures are not dependant on a risk assessment. Instead, they are a “hierarchy of controls”, which means that a particular control measure can only be applied where it is not reasonably practicable to apply one above it in the hierarchy. So, an employer must try and apply the first control measure listed, and can only use the next one if it is not reasonably practicable to do so.

These specific requirements are in addition to those more general duties on employers under the Act and Regulation.

It is important to be aware that the Regulation does not specify a minimum height at which the control measures must be implemented. This is because there are risks associated with working from any elevated position. However, it does require a restraint or a fall arrest device be used where it has been not reasonably practicable to employ the higher measures in the hierarchy of controls, and a person can fall more than two metres. Control measures are required at any height where there is a risk of falling.

The Regulation defines a scaffold as a temporary structure, specifically erected to support access or working platforms. In this regard, scaffolding may have limited application for persons working on a roof as most places on the roof cannot be reached from the scaffold’s working platform. Instead, in many instances, the roof itself is the working platform and the scaffold becomes a form of edge protection.

In practical terms this means that when working on a roof, the first two control measures in the hierarchy tend to merge where the roof is the working platform that requires fencing, subject to the roof being stable. The use of scaffolding as the fencing is one option, but it may not be reasonably practicable, and other forms of edge protection are then equally valid.

However, where scaffolding has already been provided on a site for other trades to work from prior to the roof being installed, such as bricklayers and facia and guttering installers, it should be modified to form the necessary edge protection. Scaffolding should also be used where the slope of the roof exceeds 45°. The particular requirements for the use of scaffolding as edge protection is given in section 5.2.2 below.

In determining the control measure to use to protect persons when working on roofs, an employer can only use restraints or fall arrest devices where it is not reasonably practicable to use either a scaffold or guardrail system. Where restraints or fall arrest devices are used, the reasons for it not being reasonably practicable to apply scaffolding or guardrails should be documented. In some cases it may be necessary to use more than one control. Whatever control is used, it must safeguard persons from the risks associated with falls from a height.
5.2 Protection at the edge of a roof

5.2.1 General requirements for scaffolding and guardrail systems

There are many types of purpose-designed roof edge protection systems available, including scaffolding modified for this purpose. The Australian Standard AS 4994.1 Temporary roof edge protection Part 1 General requirements specifies the design requirements for these, including the necessary strength they must have to withstand the impact of a person falling against them. Roof edge protection systems, including scaffolding configured as roof edge protection, should comply with the requirements of this Australian Standard.

Australian Standard, AS 4994.2 Temporary roof edge protection Part 2 Installation and dismantling provides guidance on determining the appropriate type of roof edge protection to use and how to use it to ensure the safety of persons working on roofs. This standard should be used at the planning stages to make sure the most appropriate type of edge protection is used for the pending job.

The scope of these standards is limited to roofs with a 35° pitch. Refer to section 5.2.4 for the requirements for steeper pitched roofs.

In determining the type of roof edge protection to be used, it is necessary to make sure that it will be strong enough to withstand the forces exerted on it should a person fall. These forces are dependent upon the momentum of the falling person, which in turn depends upon a number of factors, including:

- the type of roof surface – a person is likely to generate more momentum in falling down a roof with a slippy surface such as glazed roof tiles than one with unglazed tiles
- the pitch of the roof – the steeper the pitch, the more speed that is generated
- the length of the rafter – a person can generate more speed the further they fall.

Guardrails, including those on scaffolding, must have a top rail, mid-rail and a toeboard, or a top rail and an infill panel that serves the function of a midrail and toeboard. Infill panels should be used in addition to midrails and toeboards when the slope of the roof exceeds 26° to spread the load of a person falling against the guardrail and being injured by striking the midrail or toeboard.

The top rail of the guardrail should be at least 900mm in height above the working surface. Care is required to ensure that this height is maintained when the guardrails are erected at the exact edge of a sloping roof.

An advantage in using a form of roof edge protection that incorporates a platform, including scaffolding, is that it provides a firm surface from which to work when installing the roof trusses. In such circumstances, planning must allow for the installation of the guardrail system, or the modification of scaffolding prior to the trusses being installed.

5.2.2 Particular requirements for scaffolding

Scaffolding must comply with the appropriate parts of AS/NZS 1576 Scaffolding.

Where scaffolding has been used in the construction of the lower levels of the house, it often makes economic sense to use it as a form of edge protection for persons installing the roof cladding or carrying out other work on the roof. It is important to realise that a scaffolding system intended to be used as roof edge protection may have different performance requirements than when used to support a working or access platform. The platform level must be brought as close as possible to the underside of the eaves so that a person cannot fall from the roof onto it, which should be no lower than 500mm beneath the edge of the roof. This may require lifting the platform level or installing an intermediate hop-up platform between the platform and the edge of the roof.
A person who erects or alters a scaffold from which a person or object can fall four metres or more must hold a scaffolding certificate of competency or hold an appropriate rigging certificate of competency. There are three levels of Certificate, and the type needed depends upon the complexity of the scaffolding.

Figure 1 shows a scaffold that has been adapted as a form of roof edge protection.

### 5.2.3 Particular requirements for guardrail systems

Prior to installing a guardrail system at the edge of a roof, it is imperative to check that it is suitable for that roof. Particular attention should be given to ensuring that the supporting members, including the rafters where the system is connected to them, can support the load of a person falling against the rails. This should be checked with the rafter supplier or engineer before committing to the type of system chosen. (Some types of guardrail systems use brackets that are fixed to the roof trusses at their point of fabrication).

It is also important to ensure that the system can be erected to follow the roof’s profile, and does not result in any gaps through which a person can fall. This is a potential problem on buildings with an unusual plan profile or roof construction. In such circumstances, if a system is not available to fully secure the edge of the roof, all gaps between the roof and the guardrail system should be infilled locally to prevent a person falling.

Where a guardrail system is used, it should be in place prior to any work commencing on the roof and should not be removed until all work on the roof or section of roof is complete. Where the guardrail system is removed from a section of roof, means must be provided to prevent persons accessing that section.

A means must be developed and used that allows the guardrail system to be safely installed. Where the system is not being used in conjunction with a scaffold, this may require using temporary work platforms, such as an elevating work platform.

Similarly, where the guardrail system is to be removed upon completion of the work, means must be developed and used that allows this to be done safely.

Some types of guardrail systems use sacrificial brackets that are left connected when the roof is completed. If it is intended to use these at a later date to carry out subsequent work on the roof, both the brackets and their fixings should be assessed by a competent person.

Guardrail systems should be erected by persons with appropriate training. A person with experience in roofing should have completed a Master Roof Tilers and Slaters Association ("MRTSA") course or equivalent on the installation of guardrail systems; a person without experience in roofing should have completed the 40 hour Basic Scaffolding course as well as the MRTSA/equivalent course.

In installing the guardrail system it is important to ensure that the rafter is sound and plate connection is secure. Figures 2, 3 and 4 indicate the use of various types of roof edge protection systems applicable to the pitch of the roof. More detailed examples of the types of roof edge protection available and their use are given in AS 4994.2 Temporary roof edge protection Part 2 Installation and dismantling.
5.2.4 Particular requirements for roofs with a pitch greater than 35 degrees

Where the pitch of the roof exceeds 35° but is less than 45°, a platform should be constructed in order to minimise the likelihood of a person falling onto the top rail, or over the guardrails system. The platform should be a minimum of 450mm wide (2 scaffold planks) and include guardrails and infill panel on its outside perimeter. The platform should not be used for any other purpose. Misuse of the platform in this manner may lead to the creation of additional hazards in relation to trips and slips, persons falling onto materials, or collapse of the platform.
Figure 3: A roof with a slope greater than 35° and up to 45° with a guardrail system requires a two-plank platform. (Infill Panel has been omitted for clarity)

Where the pitch of the roof exceeds 45°, a risk assessment should be used to determine the additional safeguards required. Additional safeguards that should be considered include the use of wider platforms, higher guardrails, mesh infill panels, fall arrest systems, perimeter scaffolding (see Figure 4) or the use of boom-type elevating work platforms (cherry pickers).

Figure 4: Scaffolding as edge protection for roofs greater than 45° pitch. (End edge protection omitted for clarity).

5.2.5 Particular requirements for restraints and fall arrest devices

Although the use of fall restraint and fall arrest devices is the lowest control measure on the hierarchy of controls, there may be occasions where this is the only practicable means to safeguard persons working on a roof or an area of a roof. For example, there may be insufficient room to erect a scaffold, it may not be possible to effectively erect a scaffold or guardrail along part of the roof such as along a gable end, or when working on a brittle or fragile roof (refer to Section 6).
Where restraints or fall arrest devices are used, they should comply with Appendix A of this code of practice. Particular attention should be given to the following:

- A means must be developed and used to safely install the necessary anchorage to the supporting structure.
- If the anchorage is to be removed upon completion of the work, means must be developed and used that allows this to be done safely.
- The supporting structure must be capable of withstanding the force of a falling person. This needs to be verified both at the planning stage, including, where necessary, gaining approval from the truss supplier or engineer, and prior to connecting to it to ensure that it has been installed properly.
- If the work is to be done on an existing roof that was constructed with a sacrificial anchorage point for future use, the condition of the anchor and the supporting structure must be assessed by a competent person prior to its use, and
- Means must be developed and implemented to allow workers to safely access, connect and disconnect to the anchorage point(s).

5.3 Protection on a roof

Persons working on the roof itself, away from its edge, must also be safeguarded against the risks of falling through an incomplete or fragile roof, or openings in the roof.

There are a number of ways of controlling these risks. These include:

- Designing the roof with the trusses spaced to prevent a person from falling through the gaps between them, which should be no more than 600mm. However, this could still result in an injury being sustained by the impact of the rafters against a person falling and effectively being wedged between them or striking a limb or other part of their body against them. To minimise potential injuries to a person falling on a roof, fall prevention sarking or safety mesh (see below) should be installed over rafters irrespective of their spacing.
- The use of sarking that is strong enough to support the weight of a person in the event of them walking on it or falling on to it from the roof (i.e. the same level). Such sarking should have passed the tests specified in Appendix C to ensure it can act as fall prevention sarking, and should be stamped with the symbol shown in Figure 5. The sarking is not to be considered a work platform, and persons must be discouraged from walking on it. Where it is intended to use fall prevention sarking, it must be compatible with the roof. In particular, the layout of the roof must allow it to be installed so it can serve the purpose of fall prevention sarking, for example, the rafters are not too far apart to reduce its performance. It is important to check the sarking manufacturer’s specifications prior to using this form of control. Where fall prevention sarking is used, it must be installed in a safe manner.
- The use of safety mesh that is strong enough to support a person who may fall onto it, and is installed in a manner to maintain this strength. The mesh should comply with the Australian Standard AS/NZS 4389 Safety Mesh. Particular care is required to ensure that the mesh is securely connected to the structure and the overlap between adjacent sections of mesh is sufficient to generate the necessary strength to resist the force of a person falling onto it.

Where guardrails are used to provide a barrier to openings in the roof, they must have a top rail, mid-rail and a toeboard, or a top rail and an infill panel that serves the function of a midrail and toeboard. The top rail should be at least 900mm in height above the working surface.

Additional information on requirements for brittle roofs and removing asbestos cement roofing materials is
given in Sections 6 and 7 respectively.

![Fall Prevention Symbol](image)

Figure 5: Symbol for Fall Prevention Sarking

5.4 Protecting persons beneath the roof

The Regulation also requires that employers control the risks associated with objects falling from heights. Clause 57 sets out the requirements for controlling the risks associated with falling objects, and specifies that a secure physical barrier should be provided to prevent objects freely falling from buildings or structures, in or in the vicinity of the workplace. Where it is not possible to provide such a barrier, then measures should be provided to arrest the fall of objects.

Where the method used to safeguard persons working on the roof does not effectively retain materials on the roof – for example, if a fall restraint or fall arrest device is used, or where there is a gap between the top of the roof cladding and the bottom of a toeboard or infill panel, eg. to slide metal roof cladding units onto the roof or the tiles are used that have a deep notch in their profile – then other means must also be used to protect persons working under or near the roof. These include the provision of a screen or an overhead protective structure that catches falling objects, or the establishment of a no-go zone with the necessary barriers and training of personnel in its observation. This last method represents administrative means to control the identified risk and, in accordance with the principles of risk management, must only be used if it is not reasonably practicable to use others.
6 Brittle and fragile roofs

If a roof or part of a roof covering is comprised of fragile or brittle material, the owner or controller of the building must maintain a warning sign at any place provided as an access to the roof.

The warning sign should be at least 375mm by 330mm and made of a strong and rigid material. It should be securely fixed in an upright position where it can be seen clearly by persons wanting to gain access to the roof.

The example of a warning sign should incorporate the symbol shown in figure 6 and contain the following words: DANGER – BRITTLE AND FRAGILE ROOF – KEEP OFF!

![Figure 6: Warning sign to be used on brittle and fragile roofs](image)

Before carrying out any work on a roof covered with brittle or fragile materials, the employer must ensure the following are provided:

- permanent walkways, or if this is not practicable;
- scaffolding (see figure 7) and fall arrest systems including anchorages for every person working on a roof with brittle or fragile cladding, and
- temporary roof ladders for any person working on any part of a sloping roof with brittle or fragile cladding.

If the work involves removal of all or part of a roof with brittle or fragile cladding, a fall arrest system should be used.

If any of the brittle or fragile cladding contains asbestos, all work practices and procedures must be in accordance with the Regulation and the NOHSC Australia Guide to the Control of Asbestos Hazards in Building and Structures and the NOHSC Australia Code of Practice for the Safe Removal of Asbestos. Additional information is given in the WorkCover guide: Your Guide to Working with Asbestos.

![Figure 7: Scaffolding for the decking out of a brittle roof. (End edge protection omitted for clarity)](image)
7 Asbestos cement roof removal

When removing asbestos roof cladding the following apply:

(a) fall protection
   
   • procedures to prevent falls during the removal of asbestos cement roofing should be in accordance with Section 5 and Appendix A

(b) handling of materials containing asbestos
   
   • all work practices and procedures adopted for the handling of materials containing asbestos must be in accordance with the Regulation and the NOHSC Australia Code of Practice for the Safe Removal of Asbestos.
8 Mechanical lifting equipment

Mechanical lifting equipment such as tile elevators and builders hoists should be provided where appropriate. Where tile elevators and builders hoists are used, the following should be considered:

- the risk of manual handling injuries during installation and removal
- the risk of injury during use, for example, such as the drive mechanisms and nip points on elevator belts should be guarded
- the area around the equipment should be barricaded to prevent access and risk of injury to persons below from falling objects or the operation of the machine
- a method of installation that maintains the effectiveness of any edge protection that is in place. Edge protection should be restored immediately after removal of lifting equipment.

**Note:** A person must hold the appropriate certificate of competency to operate certain types of plant, including a builders hoist.
9 Electrical Safety

9.1 Overhead Power Lines

Overhead power lines located nearby are a potential fatal hazard to persons working on roofs. Where power lines are in close proximity, the following clearances should be observed:

(a) 4.0 metres where any metal material is being handled (see figure 8)
(b) 1.5 metres where only non-conductive material such as dry timber battens is being handled.

It is important when carrying objects to maintain these distances.

However, guidance should be obtained from the local electricity supply authority where there is a risk that the above clearances may not be established (eg. supply lines installed close to the building), or maintained eg. accidental contact with long conductive materials being used such as guttering, scaffold or guardrail poles etc. Power lines or service lines (connecting the power supply to the building) may need to be disconnected or insulated. Overhead power line insulating covers may be used. In this regard, 'Tiger Tails' are not to be considered as providing insulation to power lines, and are only a means to identify the hazard.

9.2 Residual current devices

Extension leads for power tools can be cut on sharp edges. As such, residual current devices (earth leakage devices/safety switches) should be used at all times.

Figure 8 – minimum clearance between scaffolding and electrical powerlines.
(End edge protection omitted for clarity)
10 Personal protective equipment (PPE)

10.1 Provision of PPE

Before commencing work on roofs, the contractors doing the work should assess all foreseeable conditions likely to affect the health and safety of the employees or themselves, as identified during the risk assessment procedure, and arrange for the provision and use of appropriate PPE. A fall arrest system is a form of PPE.

The following are examples of PPE often associated with roof work. Appropriate PPE, whether listed below or not, should be provided when required:

(a) fall arrest equipment
   • fall arrest harnesses, lanyard assemblies and associated equipment should be selected to protect the wearer, yet allow them access to the areas they need to work, allow freedom of movement and be comfortable. For further information refer to Appendix A of this code of practice

(b) footwear
   • to reduce the risk of falls resulting from slips, rubber soled shoes with herring bone or similar non-slip tread pattern, and with or without a steel toe cap, are recommended for work on roofs. Where footwear with a steel toe cap is used, it should comply with AS 2210 Occupational protective footwear. However, in choosing the type of footwear, it is important it has good gripping properties

(c) eye protection
   • to reduce the risk of eye injury, eye protection complying with AS1337 Eye protectors for industrial applications should be provided and used

(d) protection from sun
   • workers should be protected from sunlight/UV radiation by using a sunscreen with a sun protection factor (SPF) rating of at least 30+ and by wearing hats, shirts with long sleeves and long trousers. If short sleeved shirts and shorts are worn, the exposed parts of the body should be protected by using the appropriate sunscreen. Even with protection, there should be sufficient supervision and monitoring conducted to ensure that workers do not have extensive exposure to strong sunlight, including reflection from glazed tiles and metal roofing material. Administrative means, such as starting and finishing work early, can assist in achieving this.

10.2 Clothing

Clothing should be comfortable and be suitable for the work being done, and the prevailing weather conditions. Loose clothing which may snag or create a trip hazard should be avoided.

10.3 Maintenance of PPE

All personal protective equipment should be regularly cleaned, maintained and inspected, and replaced as necessary. For specific maintenance of fall arrest equipment refer to AS 1891.4 Industrial fall arrest systems and devices Part 4 Selection use and maintenance.

10.4 Special situations

Before carrying out work on roofs involving hazardous materials or near hazardous materials (such as asbestos removal or exposure to toxic fumes), the contractors should refer to the appropriate section of the Regulation, relevant Codes of Practice and material safety data sheets relating to the specific situation or hazard. The contractors may also consult the suppliers of PPE to determine the most suitable PPE and any other control measures.
11 Training and instruction

Under section 8(1) of the Act, employers must provide safe systems of work, training, instruction, information and supervision to ensure the health and safety of their employees.

The Regulation places further, more specific requirements upon employers to help ensure the health and safety of employees performing construction work on construction sites and in particular performing high risk construction work on roofs.

All persons involved in work on roofs should be trained to follow systems of work and work practices that enable them to perform their work in a manner that is safe and without risks to health. Only those persons who have received training and instruction should carry out work on roofs.

The employer should monitor workers and the systems of work and provide refresher training to ensure that safe systems and work practices are being followed. The training should include understanding safe work method statements and the correct use of PPE.

Work activity and site inductions must be carried out for persons undertaking construction work, and should be provided for persons undertaking other work. Training provided and the instruction given should at least include:

• work activity and site inductions (for persons performing construction work)
• measures contained in the safe work method statement devised for their work on the roof, including:
  ▪ the methods to be used in loading materials on the roof, handling, positioning and fixing of materials including the control measures, based on the risk assessment and safe work method statement, to prevent injury or falls
  ▪ the control measures, based on the risk assessment and any safe work method statement, to prevent injury or falls
  ▪ the methods of gaining access to the roof and all areas of the roof
  ▪ the use, care and storage in accordance with the manufactures’ recommendations of PPE, including fall arrest systems, and tools and equipment to be used
  ▪ the use of plant and associated equipment including electrical safety
  ▪ the use of or dealing with hazardous substances
• procedures to be adopted in the event of an incident, injury or other emergency.
12 More information

For more guidance refer to the following codes and standards.

12.1 WorkCover NSW publications:

WorkCover Code of Practice: Consultation

WorkCover Code of Practice: Electrical practices for construction work

WorkCover Code of Practice: Occupational health and safety induction training for construction

WorkCover Guide Portable ladders

WorkCover Guide Your Guide to Working with Asbestos

WorkCover Position Paper Working off stepladders

WorkCover Publication Skin cancer and outdoor workers – a guide for workers

WorkCover Publication Skin cancer and outdoor workers – a guide for employers

12.2 Standards Australia publications:

AS 1337 Eye protectors for industrial applications

AS/NZS 1576.1 Scaffolding General Requirements

AS/NZS 1576.2 Scaffolding couplers and other accessories

AS/NZS 1576.3 Scaffolding prefabricated and tube-and-coupler scaffolding

AS/NZS 1576.6 Scaffolding tube-and-coupler scaffolding – deemed to comply

AS 1639 The Design and installation of corrugated fibre – Reinforced cement roofing and wall cladding,

AS 1639 Corrugated reinforced cement roofing

AS 1657 Fixed platforms, walkways, stairways and ladders, Design construction and installation

AS 1716 Respiratory protective devices

AS/NZS 1891.1 Industrial fall arrest systems and devices Part 1: Industrial safety belts and harnesses

AS/NZS 1891.2 Industrial fall arrest systems and devices Part 2: Horizontal lifeline and rail systems

AS/NZS 1891.3 Industrial fall arrest systems and devices Part 3: Fall arrest devices

AS/NZS 1891.4 Industrial fall arrest systems and devices Part 4: Selection, use and maintenance

AS 1892.5 Portable ladders Part 5: Selection, safe use and care

AS 2050 Installation of roof tiles

AS 2210 Occupational protective footwear

AS 2424 Plastic building sheets – General installation requirements and design of roofing systems

AS 2604 Sunscreen products – Evaluation and classification
AS 2626 Industrial safety belts and harnesses – Selection, use and maintenance

AS/NZS 4040.4 Methods of testing sheet roof and wall cladding Part 4: Resistance to impact (sandbag) for sheet roof materials

AS/NZS 4200.2 Pliable Building Membranes and Underlays: Installation requirements

AS 4994.1 Temporary roof edge protection Part 1 General requirements

AS 4994.2 Temporary roof edge protection Part 2 Installation and dismantling

AS/NZS 4576 Guidelines for scaffolding

SAA HB39 Code of Common Practice for Steel Roofing

12.3 NOHSC Australia publications:

Code of Practice for the Safe Removal of Asbestos

Guide to the Control of Asbestos Hazards in Buildings and Structures

Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust

For a comprehensive range of other Codes of Practice, certification guides and occupational health and safety and workers compensation publications contact:

Publications orders Hotline: 1300 799 003

For further information contact the WorkCover Information Centre on:

13 10 50 (Cost of a local call from anywhere in NSW)
Appendix A – Fall arrest systems

A.1 General

The function of a fall arrest system is to arrest a person’s fall and to minimise injuries. This provides a lesser level of risk control than preventing the fall in the first place. Therefore fall arrest systems should only be used when it is not reasonably practicable to control the risk with a higher-level control measure, such as scaffolding or edge protection, or in conjunction with it, to control a remaining risk, such as falling through the roof.

The users of fall arrest systems should be competent in its set-up and use, including inspection of wear and damage during use, storage and transport.

If a fall arrest system is used then an appropriate emergency rescue plan should be drawn up for the site, as a person left suspended in a harness following a fall is likely to experience suspension trauma. Further information on suspension trauma is given in paragraph A6.

When fall arrest systems are used, they should be evaluated to ensure that they are effective, and that no new hazards are created (such as trip hazards, or a person’s movements being restricted to the extent that they can not safely perform the required task).

Industrial fall arrest system components should be used in accordance with the manufacturer’s instructions and comply with the relevant part of AS/NZS 1891. Parts 1 to 3 of this Australian Standard provide design, testing and marking requirements for fall arrest system components, and Part 4 provides information on the selection, use and maintenance. Purchasers of fall arrest equipment should request confirmation from the supplier that the equipment complies with the relevant part(s) of AS/NZS 1891 and that the supplier provides the manufacturer’s instructions for use.

Note: Manufacturer’s instructions are no substitute for training and instruction.

Anchor points should be selected or designed to resist the maximum likely impact force. For example, a single fall arrest anchor point for one person is specified in AS/NZS 1891.4 Industrial fall arrest systems Part 4 Selection, use and maintenance as requiring an ultimate capacity of 15kN, which is equivalent to the weight of a family sedan. Capacity requirements for other situations are specified in AS/NZS1891.4, or for proprietary static lines (horizontal lifelines), by the suppliers.

Note: Most roof truss suppliers state that their roof trusses can only be used as an anchorage point or to affix an anchorage point if the truss supplier specifies that they can do so.

The various parts of fall arrest systems and harnesses need to be compatible. It is therefore essential for the user to check that all components are compatible. For connections, this includes ensuring that they fit together in a way that does not result in loading of the locking gate, release of a locking mechanism, jamming or excessive wear. This is especially relevant for components from different suppliers.

A.2 Fall arrest system configuration

(a) Where practical, fall arrest systems should be used as restraint systems to prevent workers moving from safe to unsafe areas on the roof. Figure A1 shows a single anchor and fixed length lanyard used in restraint mode, the user cannot fall off the edge and can only reach the edge at the 4 isolated points shown. Where this is not possible, eg. where the work needs to be performed at the edge of the roof, the system should be configured to reduce the potential fall distance, as generally the greater the fall the greater the potential for injury. A fall arrest system incorporating a fall arrest harness must be configured to start to arrest the fall before the person has fallen more than 2 metres. The pendulum effect, described in A5, increases the fall distance, as shown in Figure A2.
(b) Although the fall arrest is to commence within 2 metres, the process of arresting the fall allows the person to travel further. It is therefore essential that there is sufficient clearance available to allow for the fall to be arrested before the person impacts with the ground, or structure below. AS/NZS 1891.4 *Industrial fall arrest systems* Part 4 *Selection, use and maintenance* provides guidance on calculating the required clearance distances.

(c) If a line and rope grab fall arrester device is used, the user needs the device in front in order to manually operate the mechanism. In this case, the user should consider a harness with a front fall arrest connection point.

(d) There should be a minimum of slack in the lanyard or safety line between the person and attachment to the anchorage.

(e) Energy absorbers should be used as part of the lanyard assembly to reduce shock to the body and anchorage point by absorbing some of the fall energy, unless the system configuration ensures the load will not exceed 6kN.

(f) The use of lanyards in conjunction with inertia reels should be avoided as they could reduce the effectiveness of the inertia reel. Where the use of a short lanyard is necessary for ease of connection to the rear harness connection point of an inertia reel, it should be no greater than 450mm in length.

(g) Persons using a fall arrest system must be attached to the system at all times where there is a risk of a fall. If transferring from one anchorage to another a second lanyard attached to the harness may be used. The second lanyard must be connected to the next anchorage before disconnecting the first.

(h) Snaphooks must not be connected to each other.

(i) For multiple users, the system should be configured and used to avoid crossed or tangled lanyards/lines. See Figure A3, and

(j) It is strongly recommended that persons using fall arrest systems should not work alone. Where it is necessary that persons do work alone, they should be constantly monitored to ensure they have not fallen. In the event of a fall, it is vital that the person be rescued as soon as possible, even if uninjured. This is necessary as a suspended person may suffer suspension trauma, as discussed in paragraph A6.

A.3 Inertia reel systems

(a) Inertia reels are not designed for continuous support but become effective in the event of a fall. They should not be used as working supports by locking the system and allowing them to support the user during normal work. Inertia reels may be less effective for certain applications such as stopping a person sliding down the inclined surface of a pitched roof.

(b) Most inertia reels are designed to operate with the extended line close to vertical, ie anchored close to directly above the user.

(c) Where the manufacturer permits the use of the inertia reel in a horizontal position, the configuration should not allow for the webbing or rope line from an inertia reel to traverse over a sharp edge in the event of a fall.
Figures A1, A2 and A3
A.4 Static lines (horizontal lifelines)

(a) static lines (also known as horizontal lifelines or safety lines) should comply with AS/NZS 1891.2
*Industrial fall arrest systems and devices Part 2: Horizontal lifeline and rail systems*

(b) the installation of static lines should be carried out in accordance with the manufacturer’s or
designer’s specifications by a person holding a Certificate of Competency as a rigger or scaffold, and

(c) the static line should be located as high as practicable above persons connected to it. It is dangerous
to work above the static line as the person could fall more than the maximum 2 metre fall before fall
arrest commences.

A.5 Pendulum effect

The ‘pendulum effect’ is a potential hazard associated with the use of fall arrest systems, especially in
systems using inertia reels, long lanyards or anchorage lines with rope grab fall arresters. The pendulum
effect may also occur within the interior of the roof if the positioning of the inertia reel allows for a
significant length of unsupported line connected to the user. The 2 types of pendulum effect are swing
down and swing back.

(a) swing down

Swing down can occur if an inertia reel, lanyard or anchorage line is extended out so that the line
makes an extreme angle with the roof’s perimeter edge. In this situation, the forces generated in an
arrested fall over the edge will cause the line to rotate/slide back along the roof perimeter until it
reaches a position in line with the anchorage point and at right angles with the roof edge.

As the line moves back in this way, the section overhanging the roof lengthens, thus dropping the
attached worker further than the original (arrested) fall distance. If the length of the unsupported line
equals or is greater than the height of the building then the worker will hit the ground (see Figure
A4). Even if the worker can not hit the ground the pendulum increases the fall distance and the
likelihood of hitting another object as well as potential for the line to be damaged as it rotates/slides
along the roof edge.

![Figure A4 swing down effect](image)
To eliminate the swing down effect:

- a secondary anchorage point and lanyard or line could be used (see Figure A5)
- place the inertia reel anchorage point more or less perpendicular to the position of the line at the perimeter edge. A mobile anchorage on a static line or rail system helps achieve this.

![Figure A5: Use of a secondary anchorage and lanyard removes or reduces the swing down effect.](image)

(b) swing back

This occurs when the person is anchored to a point on the other side of the void that they fall into, and therefore swing back into the building (see Figure A6). This effectively increases the fall distance and can lead to the person hitting the structure. Anchorage configurations should be established to avoid such situations.

![Figure A6: Swing back](image)

### A.6 Suspension trauma

Suspension trauma is caused by the blood pooling in the limbs of a person suspended relatively motionless in a harness and has a similar effect to a person standing at attention for extended periods of time potentially resulting in fainting. A person suspended vertically in a harness when they faint risks their condition deteriorating, potentially leading to death.

It is therefore important to have an appropriate emergency rescue plan to enable a person left suspended in a harness following a fall to be rescued as a matter of urgency.

A person’s susceptibility to suspension trauma appears unrelated to fitness level, and cannot be readily assessed in advance.
There are measures that apparently can reduce the likelihood of suspension trauma in a person suspended in a harness, whether they have been involved in a fall or not. The person should move into a horizontal position, elevate the knees and pump the legs by pushing against a wall or other solid object at regular intervals. Where a person is suspended from the rear fall arrest connection on the harness they may not be able to become horizontal, but should still be encouraged to regularly pump the legs, preferably against a solid object.
Appendix B – Example of a typical risk assessment checklist

Safe working on roofs risk assessment checklist

Site address: ..................................................................................................................................

Principal contractor: .......................................................................................................................

Roofing contractor: ........................................................................................................................

Site supervisor: ............................................................................................................................

This checklist is designed to help identify the hazards associated with carrying out work on residential roofs, and covers the main items specified in the body of the code of practice. This checklist is not designed to cover all of the risks identified when working on a roof, but to help employers and roofing contractors get started on the process of identifying the hazards associated with working on residential roofs.

For further information visit the WorkCover web site at www.workcover.nsw.gov.au or phone the WorkCover Assistance Service on 13 10 50.

If you mark a NO box on the checklist, the employer needs to take action to eliminate or control the hazard.

<table>
<thead>
<tr>
<th>Roof Hazards and Examples of Control Measures</th>
<th>Checked OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has a perimeter scaffold been erected or has a guardrail system been installed?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If using scaffolding or a guardrail system, has it got a guardrail, midrail and toeboard, or a guardrail and infill screen with a kickplate?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If using scaffolding or a guardrail system to prevent falls, does it incorporate an infill panel if the slope of the roof is greater than 26º?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If using scaffolding does it comply with AS/NZS 1576?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If a scaffolding is being used, is the platform 500mm or less below the edge of the roof?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If the scaffolding’s platform is more than 4m above the surrounding ground, has it been erected by a ticketed scaffolder?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If using a guardrail system, is it appropriate for the type of roof?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If not using a scaffolding or guardrail system, are the reasons why it is impracticable to do so recorded?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If not using a scaffolding or guardrail system, is a fall arrest system being used?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If using a fall arrest system, have the anchorage points been checked by a competent person?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If using a fall arrest system, has a safe system for attaching to and detaching from the anchorage point been established?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If using a fall arrest system, have all relevant personnel been trained in its use?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If using a fall arrest system have rescue procedures for recovering persons who may fall been established?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>If the roof structure requires modification or bracing to support the safeguards identified in the safe work method statement, have the responsible people been consulted?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>Is there a safe system of roof access and egress that reduces the risk of slipping, tripping or falling?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>Are ladders properly set up and secured?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>Are there clearly defined site unloading and storage areas for the delivery and removal of materials and plant?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>Is a tile elevator or builders hoist used to transport material to the roof?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>Question</td>
<td>Yes</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>If a tile elevator or builders hoist is not used to transport material to the roof, is there a system in place that controls manual handling risks?</td>
<td>Yes</td>
</tr>
<tr>
<td>If a builders hoist is used, is it operated by a ticketed operator?</td>
<td>Yes</td>
</tr>
<tr>
<td>Does the builders hoist comply with AS 1418.7?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are warning signs, such as: ‘Persons Working Above’; ‘Nail Gun In Use’; ‘Elevator/Hoist In Use’ etc, clearly displayed in a prominent position?</td>
<td>Yes</td>
</tr>
<tr>
<td>Have designated no-go zones been cordoned off, eg. areas beneath the tile elevator?</td>
<td>Yes</td>
</tr>
<tr>
<td>Have power sources been disconnected, insulated or otherwise made safe before proceeding with roof work if there are electrical hazards within 4.0 metres of the roof?</td>
<td>Yes</td>
</tr>
<tr>
<td>Has induction training been provided for new employees to safely work on roofs?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are procedures in place to discontinue work if inclement weather conditions render exposed roof work dangerous?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are systems of work provided if there are foreseeable manual handling issues?</td>
<td>Yes</td>
</tr>
<tr>
<td>Has a Residual Current Device been attached to the leads/power source for portable electric power tools? (This is particularly important when leads are being dragged over sharp edged metal roofs.)</td>
<td>Yes</td>
</tr>
<tr>
<td>Have all the necessary precautions been implemented before proceeding if asbestos products are being handled, such as old fibro sheets?</td>
<td>Yes</td>
</tr>
<tr>
<td>Have your employees been provided with the appropriate Personal Protective Equipment and the training to properly use it?</td>
<td>Yes</td>
</tr>
<tr>
<td>Is waste material isolated and contained for safe removal from the site such as old fibro?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Checklist Completed By: ........................................(Print Name)..........................................(signature)

Date: .........../.........../...........
Appendix C – Test for fall prevention by sarking

This Appendix contains a description of the modifications to the test method described in AS/NZS 4040.4 Methods of testing sheet roof and wall cladding Method 4: Resistance to impact (sandbag) for sheet roof materials that are required to test roof sarking materials under Australian conditions to determine its suitability as fall prevention sarking. This document shall be read in conjunction with the AS/NZS 4040.4.

This test was developed by Australian Foil Insulation Manufacturers Association (AFIMA), and is reproduced with its permission. The test described below serves to satisfy the requirements for the use of the “CERTIFIED – Fall Prevention” logo, a registered trademark of AFIMA. This test is the version revised in July 2003.

The test procedure shall be performed in accordance with the AS/NZS 4040.4, with the following modifications:

<table>
<thead>
<tr>
<th>Section of AS 4040.4</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Replace section, I Scope (METHOD page 1) with:</td>
</tr>
<tr>
<td></td>
<td>“1 Scope</td>
</tr>
<tr>
<td></td>
<td>This test method is intended to simulate the accidental falling of a person onto a sarking material incorporated into a roof structure.”</td>
</tr>
<tr>
<td>2</td>
<td>Section, 2 Referenced Document (METHOD page 1): Unchanged</td>
</tr>
<tr>
<td>3</td>
<td>Section, 3 Principle (METHOD page 1): Unchanged</td>
</tr>
<tr>
<td>4</td>
<td>Section, 4 Apparatus (METHOD page 1): Unchanged</td>
</tr>
<tr>
<td>5</td>
<td>Replace section, 5 Test Specimen (METHOD page 1) with:</td>
</tr>
<tr>
<td></td>
<td>“5. Apparatus &amp; materials</td>
</tr>
<tr>
<td></td>
<td>5.1 Test frame, (1.8 m wide) x (3 rafter bays in length), consisting of four 90 mm x 45 mm rafters at spacings as listed below, supported 500 mm above floor.</td>
</tr>
<tr>
<td></td>
<td>Fall Prevention Sarking must be tested at rafter spacings of</td>
</tr>
<tr>
<td></td>
<td>(a) 600mm to model building practice between 450mm and 600mm, and</td>
</tr>
<tr>
<td></td>
<td>(b) 900mm to model building practice greater than 600mm and less than or equal to 900mm.</td>
</tr>
<tr>
<td></td>
<td>5.2 Four battens, 19 mm x 38 mm or 38 mm x 38 mm. The centre two battens shall be at 400mm centres, the outer battens to be at 300mm centres. Nails for installing battens shall be 3.15mm and of such length that the nail will penetrate not less than 50mm into the rafter.</td>
</tr>
<tr>
<td>6</td>
<td>Replace section, 6 Procedure (METHOD page 2) with:</td>
</tr>
<tr>
<td></td>
<td>“6.1 A total of four sandbag drops shall be performed on each test material. (Two of “Configuration 1” and two of “Configuration 2” as described below.)</td>
</tr>
<tr>
<td></td>
<td>In each test, the point of impact of the sandbag shall be between the two central rafters and the two central battens.</td>
</tr>
<tr>
<td></td>
<td>Configuration 1: Lay one run of the test material across the rafters such that mid-width of the material coincides with the point of impact of the sandbag.</td>
</tr>
<tr>
<td></td>
<td>Configuration 2:</td>
</tr>
<tr>
<td></td>
<td>(a) For 600mm rafter spacings: Lay two runs of the test material across the rafters such that they overlap by 150mm along their long edge. Position the test material such that the point of impact of the sandbag coincides with a point 75mm from the edge of each run.</td>
</tr>
</tbody>
</table>
(b) For 900mm rafter spacings: Lay 2 runs of test material across the rafters such that they overlap by a minimum of 150mm along their long edge. NB: At rafter spacings greater than 600mm, un-battened laps regularly ‘open-up’ under impact, resulting in a ‘FAIL’. One solution is to increase the overlap and install a batten equidistant and far enough from the edges of the 2 runs of test material such that it will not tear out under impact. This becomes a ‘central batten’ as denoted in Section 6.3.

6.2 Ensure a sag depth of not more than the supporting battens and in no case to exceed 40mm below the batten at the mid point between rafters in accordance with recommendations of AS/NZS 4200.2.

6.3 Nail down battens, commencing at one end and working to the other. The two central battens should be spaced 400 mm apart at centre, the outer battens spaced 300 mm from the central battens. Batten down well, ensuring high pressure contact between rafter and batten, in accordance with AS 2050. If rafter surface has received too many nails to allow a firm hold, change the position of the batten or discard the rafter.

Note: No batten shall be fixed closer than 150mm from either end of the test material.

6.4 Roll bag around to ensure sand is soft and uncompacted.

6.5 Raise bag to 2500 ± 100 mm, above the surface of the test material.

6.6 Release the bag by a quick release device (e.g., by cutting a restraining rope) and allow it to fall freely

6.7 Remove the bag from the test material, inspect and report.

Replace section, 7 Report (METHOD page 3) with:

“7.1 If the bag has touched anything apart from the sarking during its descent (e.g. a batten or a rafter) the test result is: Invalid

7.2 If it is obvious that the battens have not been nailed down with high pressure the test result is: Invalid

(Typically, if the sarking tears only in a straight line, starting at the nail, this infers that the batten has not been nailed down with enough pressure).

7.3 If the sarking extends to the point that the bag touches the floor during impact the test result is: Invalid

(Note that the bag may spring back as the laminate contracts after impact.)

7.4 If the sarking is not torn at any point, or

If the sarking is torn, but holes will not allow a ball, 75 mm in diameter, to pass through the test result is: Pass

7.5 If the sarking is torn, and holes at any point will allow a ball, 75 mm in diameter, to pass through, or if the sandbag passes through the laminate the test result is: Fail

7.6 If the bag passes through the lap without any of the above damage to the material, the test result is: Fail

7.7 The report and the certificate shall clearly indicate:

(A) Whether sarking passes or fails,

(B) The rafter spacing

(C) Details of the fixing procedure used for tests performed at the lapped edge.

(D) Observations on the appearance of the sarking after impact.
REFERENCES FOR APPENDIX C

AS 2050 Installation of Roof Tiles.

AS/NZS 4040.4 Method of testing sheet roof and wall cladding: Resistance to impact (sand-bag) of sheet roof materials.

AS/NZS 4200.2 Pliable Building Membranes and Underlays: Installation requirements.