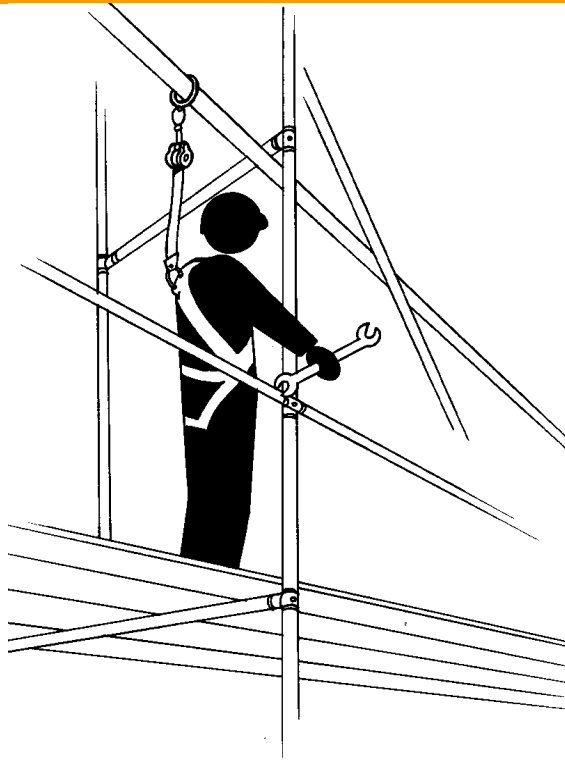
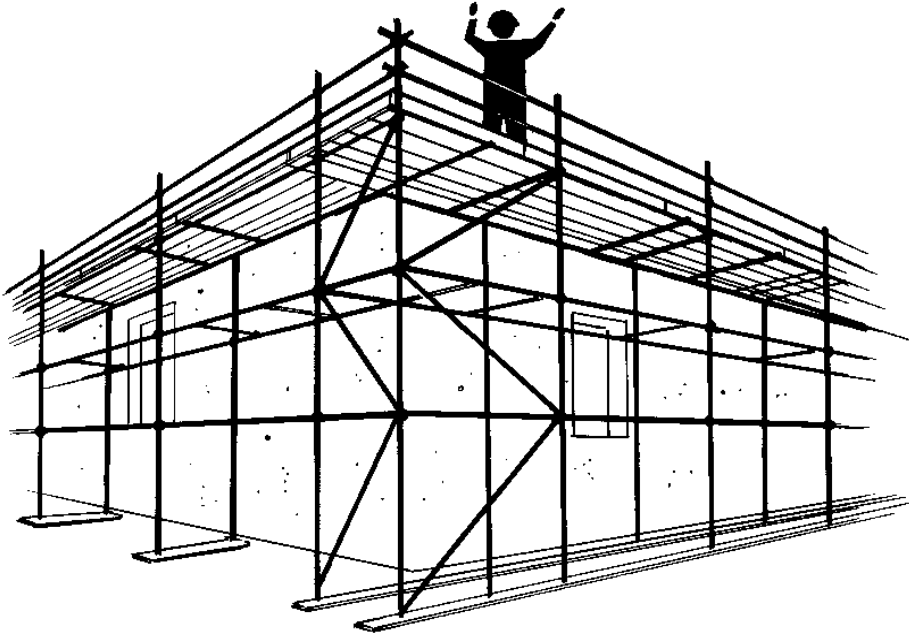


Code of practice



Prevention of Falls at Workplaces – Part 1 – Roofing and Cladding

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1. Introduction

The code of practice “The Prevention of Falls in Workplaces” has been designed to be added to in parts. General information relating to working where there is a potential for falls is contained in the main document.

1.1 What is a code of practice?

This part, Part One “The Prevention of Falls in Workplaces – Roofing” contains information specific to the roofing trade. It has been developed around the three major hazards within this industry. This is:

- (1) risk posed by both access and egress to the working area;
- (2) the potential for falling off high work areas; and
- (3) the potential to fall through high work areas.

Specific reference is made to aspects of the Work Health (Occupational Health and Safety) regulations, 1996 where relevant. These are specific regulations relating to work at height and complying with these does not ensure compliance with other aspects of the regulations which may impact on the work you do.

1.2 Scope

This code of practice relates to roofing and cladding work conducted where there is a risk of people or materials falling..

Work is conducted where a free fall of 3 metres or greater is possible, specific fall prevention mechanisms such as those described in this code must be included as part of that work.

Work conducted with a potential free fall of less than 3 metres is subject to a risk assessment as described in this code. Many situations which present a free fall potential under the three metres will still require specific fall prevention measures.

Risk assessment must take into account factors likely to increase the risk of falling people or materials (such as climatic conditions, roof pitch and design roof access) and factors likely to effect the consequence of falling people or materials (such as impact surface and public access).

2. Access to and egress from work stations

2.1.1 Regulation 47 – Access and egress

In part states:

- (1) The owner or occupier of a workplace shall provide and maintain a means of access to and egress from the workplace which -
 - (a) enables a worker at the workplace to move safely throughout the workplace in the performance of the worker's normal duties;
 - (b) allows safe and rapid egress from the workplace in an emergency; and
- (2) An employer shall ensure that the means of access to a place at a workplace where a worker is likely to pass through or be required to work in is kept free of obstructions so that access is readily available at all times.

If workers 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.

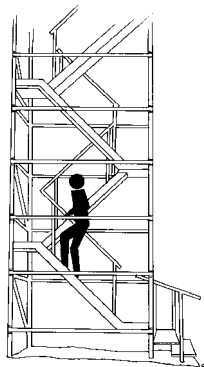


Figure 1

An example of external temporary scaffold access stairs erected at the perimeter of a building or structure (mid-rail required but not shown).

This should take into account the tools and equipment they may be required to carry to and from, and around the work area.

In providing safe access to and egress from, and movement around a work area, consideration should be given to:

- the installation of fixed work platforms, walkways and stairways;
- the use of temporary work platforms such as:
 - elevating work platforms
 - cherry pickers
 - crawl boards
 - ladders or safety steps
 - scaffolds
 - personnel cages;

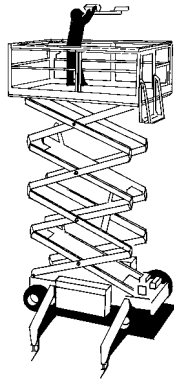


Figure 2
An example of a scissor lift -elevating work platform. A fall arrest system and device is not required on this item of plant.

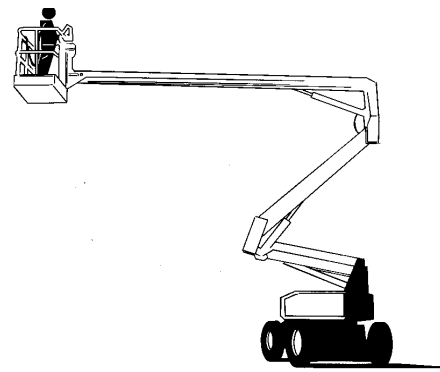


Figure 3
An example of a boom arm platform with safety harness and lanyard assembly.

- 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;
- the method of getting plant, equipment and materials to the work area; and
- exposure of access ways to the weather (eg. rain can make surfaces slippery, strong winds can cause loss of handgrip).

2.1.2 Regulation 49 - Housekeeping

A workplace shall be kept in a clean condition, free from accumulation of debris and maintained in a condition so as to avoid any hazard to the health and safety of a worker at the workplace.

2.1.3 Regulation 51 - Floors

A floor at a workplace shall, as far as is practicable, be slip resistant and free from an obstruction that may cause a worker to trip or fall.

Many accidents occur when a worker trips or slips on an obstruction in an accessway.

Have you considered:

- if all access ways are clear of obstructions and readily accessible?;
- whether the size of load being carried obstructs the workers vision or affects their balance? For example, rolls of insulation may not be heavy but they are bulky and can obscure a worker's view of the floor when being carried.

3. Prevention of falls of workers

3.1 Edge protection

3.1.1 Regulation 47A – Prevention of falls

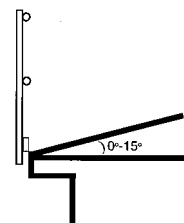
States -

- (1) Where a worker is required to work –
 - (c) in or on an elevated workplace from which he or she could fall;
 - (d) in the vicinity of an opening through which he or she could fall;
 - (e) in the vicinity of an enclosure or container into which he or she could fall;
 - (f) on a surface through which he or she could fall; or
 - (g) in any other place from which he or she could fall,
 - (h) and there is a reasonable likelihood that the worker could be injured if he or she were to fall, then protection against the fall shall be provided -
 - (i) by the provision of a safe means of access to the workplace;
 - (j) by the provision of secure fences, edge protection, working platforms, covers or other forms of safeguarding; or
 - (k) where the protection provided by paragraphs (f) or (g) is not practicable, by the provision and maintenance of safe systems of work.
- (2) Safeguarding provided for the purposes of subregulation (1)(g) shall be kept in good condition and shall not be removed while the work is being performed except, so far as is necessary, to allow access or egress of a person or the shifting of plant or material.

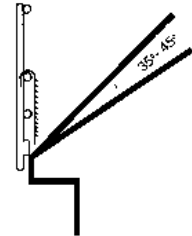
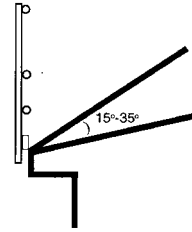
Where guard rails are used to reduce the risk of a person falling from a height or into a depth, the guard rails should comply with *AS 1657 Fixed platforms, walkways, stairways and ladders - Design, construction and installation, or AS/NZS 1576.1 Scaffolding - General requirements.*

Where protection of the perimeter of a work area is provided by a guard rail system it should incorporate:

- a top rail, mid rail and fender (toe) board when roof slopes are between 0 degrees to 15 degrees from horizontal;



- a top rail, mid rail, bottom rail and fender 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, fender 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 to reduce 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.



Where roof slopes exceed 45 degrees, the slope is unsuitable to work on without a support system, such as a roof ladder or scaffold platform, to prevent sliding.

The guard rail system must be constructed to withstand a force of 0.55kN (approximately equivalent to 55kg) applied at any point of the guard rail system.

The top handrail must be not less than 900mm or more than 1100mm above the working surface.

If access points are required for equipment (eg. hoist) they should be adequately protected with gates, safety chains or any other means to prevent a person falling.

3.2 Scaffolding and handrails

3.2.1 Scaffolding

Scaffolding can be very effective protection in preventing falls. There are specific requirements which apply to the design, construction and erection of scaffolding.

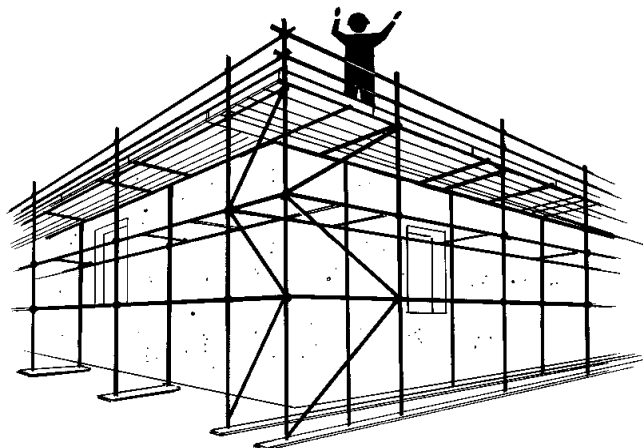


Figure 4
Perimeter scaffold with a fully decked working platform, guard rails and fender boards.

Issues to be considered:

- scaffolding which exceeds, or is likely to exceed a height of 4m must be erected, altered or dismantled by a certified scaffolder;
- providing safe access to and egress from the scaffold;
- provision of edge protection (eg. guard rails and fender boards) at every open edge of a work platform;
- mobile tower frame scaffolds can be used to provide safe working platforms;
- scaffolding which is incomplete and left unattended should have danger tags and warning signs attached at appropriate locations to prevent use; and
- the scaffold should be inspected and "marked" 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.

Scaffolding must conform to AS/NZS 1576 Scaffolding. This standard is in specific parts which set out:

- general requirements (AS/NZS 1576.1);
- requirements for couplers and accessories for use with tubular scaffolding (AS 1576.2);
- performance requirements for prefabricated and tube-and-coupler scaffolding (AS/NZS 1576.3);
- requirements for materials and design of suspended scaffolding including the supporting structure (AS 1576.4);
- prefabricated splitheads and trestles (AS/NZS 1576.5); and
- deemed to comply metal tube and coupler scaffolding (As 1576.6).

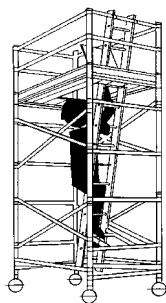


Figure 5

Mobile scaffold, access ladder and trapdoor to provide the maximum size hazard-free working platform.

3.2.2 Scaffolding as roof edge protection

Scaffolding may be used as fall protection around the edge of a roof by incorporating guardrailing into the scaffolding. The sketches below show common examples of acceptable roof guardrailing arrangements on scaffolding.

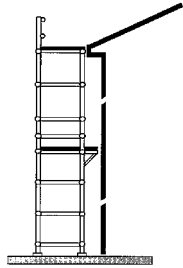


Figure 6
Scaffold platform at edge of roof with hop-up bracket for other trades.

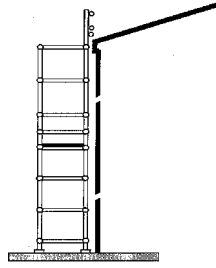


Figure 7
Inside standards supporting guardrailing

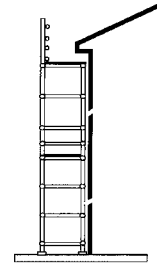


Figure 8
Scaffold platform below edge of roof.

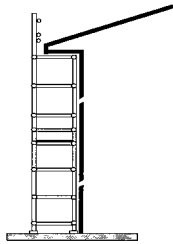


Figure 9
Outside standards supporting guardrailing.

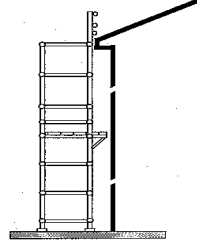


Figure 10
Inside standards supporting guardrailing with hop-up bracket for other trades.

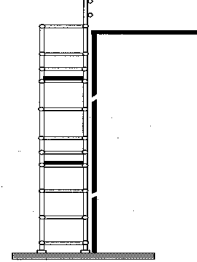


Figure 11
Inside standards supporting guardrailing adjacent to a flat roof structure.

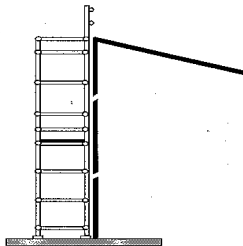


Figure 12
Inside standards supporting guardrailing adjacent to a roof structure that slopes away from the top edge.

4. Other control options

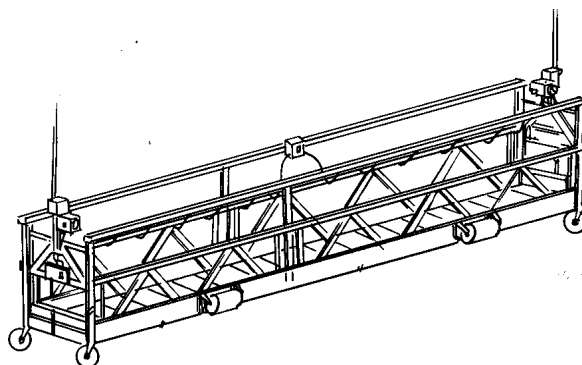
4.1 Other types of working platforms

Depending on the situation, other types of work platforms can be considered. These include:

- elevating work platforms (eg. cherry pickers, scissor lifts, order pickers);
- crawl boards;
- personnel cages;
- light duty suspended stage (eg. swing stages, boats, cradles); and
- false cars (platforms used for work in lifts before lift cars are installed):
 - Lanyard assemblies used on false cars should be as short as practicable.
 - Lanyards should not be connected to top guardrails which are only required by AS 1657 to withstand a force of 0.55kN (approximately equivalent to 55kg).
 - *AS 2626 Industrial safety belts and harnesses - Selection, use and maintenance* requires anchor points for safety harnesses to withstand a force of 15kN (approximately equivalent to 1500kg).
 - A purpose made anchor designed to withstand that force should be attached to the floor of the false car.

Figure 12

An example of a light duty suspended stage with two wire ropes to each winch. A vertical lifeline should be used.



4.2 Personal Protective Equipment (PPE)

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

- the nature of the work or the work process concerned;
- the severity of any potential injury or disease;
- the state of knowledge about the injury or disease related to the work or process; and

- whether the costs of preventing, removing or mitigating that injury or disease are prohibitive in the circumstances.

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

- where it is not technically feasible to achieve adequate control of the hazard by other measures. In these cases, the hazard should be reduced as far as practicable and then, in addition, suitable personal protective equipment should be used to secure adequate control;
- where a new or revised risk assessment indicates that personal protective equipment is necessary to safeguard safety and health until such time as adequate control is achieved by other methods, for example, the use of fall arrest systems and devices until guard railing is erected; and
- during routine maintenance operations. Although exposure to hazards occurs regularly during such work, the infrequency and small number of people involved may make other control measures impracticable.

4.3 Work positioning and fall arrest systems

Work positioning system

An assembly of body belts and buttock straps described for attachment to a lanyard or static line for use where there is no risk of a free fall. Industrial rope access systems are a specialised and job specific form of abseiling. The system is suited to access work such as window cleaning, sign maintenance on high rise buildings and other forms of maintenance where it is not practicable to use other forms of access. The systems are only suited to light duty type of work.

Where it is necessary for abseiling to be carried out in a workplace, personnel must receive training and instruction in the technique and be adequately supervised. Records of training must be kept.

Supervisors must ensure communication between personnel is sufficient for the task and the procedures are clearly understood by the abseiler, the top edge person and brake person at the bottom of the descent.

A back up system must be used to protect the abseiler, either a top or bottom belay or an automatic locking device. Any person within 2 metres of an unguarded edge must be adequately secured. Work positioning systems are a form of engineering control.

Fall arrest systems

An assembly of interconnecting shoulder and leg straps with or without a body belt designed for attachment to a lanyard or fall arrest system as specified in AS 1891.3 and AS 1891.1 where there is the potential of a free fall. Fall arrest systems are a form of personal protective equipment.

Fall arrest systems are generally ineffective for use with a free fall height less than 4 metres. Ensure that your risk assessment considers the limitations of personal protective equipment.

4.3.1 Regulation 82 - Safety belts and anchorages

- (1) Subject to subregulation (4), where a worker at a workplace is required to perform work on a part of a building or structure where there is a risk to the health and safety of the worker if the worker were to fall from the building or structure, and no other means of protecting the worker is practicable, an employer shall provide a safety belt, harness and lanyard complying with AS 1891, and a safe anchorage to which the safety belt can be attached.
- (2) Where cleaning or maintenance work on a building or structure is performed by a worker using equipment referred to in subregulation (1), an employer shall ensure that the building or structure has safety belt anchorages complying with BS 5845 or its replacement AS/NZ 1891.4 fixed permanently to it..
- (3) Safety belt anchorages referred to in subregulation (2) shall be positioned on a building or structure so that a worker is able to attach a lifeline or safety belt to an anchorage before proceeding to a position where the worker may fall.
- (4) Where it is not practicable, due to the nature of the work to be performed, for an employer to comply with this regulation, a worker may perform the work without the equipment required by this regulation if the worker is competent to perform the work.

Where the determination is made to use competent workers rather than some form of physical control measure, a risk assessment must be conducted and documented in each instance prior to work being undertaken. This assessment should include the rationale for not using other control methods.

Fall arrest systems and devices must be provided where other means are not practicable or to provide greater protection for the worker. For example, on a very steep roof where standard roof edge protections would not provide adequate protection.

Choosing the most appropriate fall arrest system and device is essential. The correct installation and use of such equipment is critical to its effectiveness when arresting a fall.

When planning the site layout and sequence of construction for installing a static safety line system, consideration should be given to:

- the most appropriate fall arrest system and method of installation;
- provision of anchorage points for static lines capable of supporting imposed loads; and
- provision of safe access to and egress from a work area for persons installing anchorage points.

The employer and/or person who has control of a workplace and employees should ensure there is safe access to and egress from the work area before work commences.

This includes:

- assessment of wind and weather; and

- organising of:
 - fall prevention equipment;
 - access;
 - personal protective equipment;
 - formulation of specific instructions for workers; and
 - means of rescuing persons from safety harnesses following arrested falls.

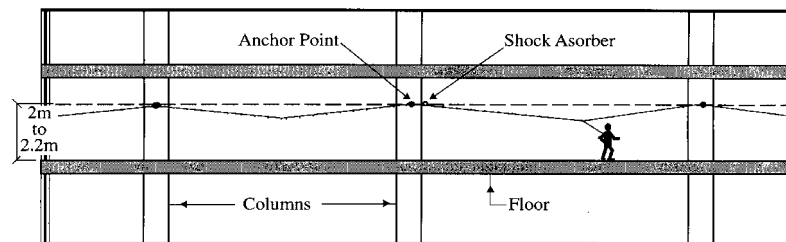


Figure 14

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

4.3.2 Cable (Static Line)

The cable used in the installation of safety lines should comply with *AS 3569 Steel Wire Ropes*. The cable should be of a minimum diameter of 10mm and provide a minimum safety factor of 10. The cable should have a guaranteed breaking strain (GBS) of 60kN (approximately equivalent to 6 tonne). There are many variables to consider in the erection of fixed static lines. These include the number of people on the system at any one time, the length of the system and the length between intermediate supports, length of lanyard of the user and distance below the user. Engineer designed systems are necessary to consider all these variables.

Industrial shock absorbers should be used to ensure the force generated in simultaneous falls on the safety system will not generate more than 15kN (approximately equivalent to 1500 kg) at the anchor points unless the anchor points have been designed by an engineer to withstand a greater force.

- Tensioning should be achieved by turnbuckles or other appropriate means.
- The cable should be placed to eliminate the risk of tripping. Where practicable the cable should be located no less than 2 metres above the floor of the work area.

4.3.3 Cable spans (Static Lines)

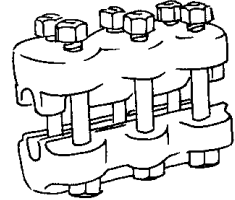
- The cable should be supported at each column or in accordance with an engineer's specifications.
- Where practicable the height of the cable should not be greater than 2.2 metres above the working platform.

- Where turnbuckles are used to tension static lines they must be as described in 4.3.6 of this code.

4.3.4 Cable end (Termination of Static Lines)

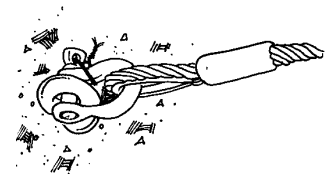
The termination of the cable should be by way of a thimble eye. Where practicable, ends should be secured by one of the following:

- double base clamps with a minimum of 3, at equal spaces with a minimum 200mm tail past the last clamp;
- hand splice with thimble eye; or
- machine splice with thimble eye.



Note:

Cables and fittings may be secured directly to anchorage points with "D" or bow shackles of a minimum size of 12mm or having a safe working load of not less than 20kN (approximately equivalent to 2 tonne). The pin should be moused (lashed) to the shackle.



4.3.5 Installation of anchorage points

Anchorage points used should be located as high as equipment permits as it is dangerous to work above the point of anchorage.

The diameter of the threaded sections of bolts and their anchorages should not be less than 16mm.

Note:

All bolts referred to in this document should comply with AS 2317 Collared eyebolts.

The following types of anchorages are acceptable when used in concrete:

- anchors cast in situ
 - a wall tie (shee bolt) purpose designed
 - an engineer designed anchorage
- a chemical type anchor
 - incorporating a 16mm diameter bolt, 110mm embedment, used in shear
- friction type anchor
 - the anchorage should be a collared eye or eye bolt with the threaded section being no less than 16mm diameter and the collared eye nut tightly fastened against the concrete surface.

Chemical or friction type anchorages should be used in shear only, ie, the bolt should be at right angles to static cable.

Anchorage should have a design capacity of 15kN (approximately equivalent to 1500 kg) each, except where verification of a lesser design load provides for a minimum safety factor of 10.

4.3.6 Turnbuckles

- If turnbuckles are used the threaded section shall be a minimum of 12mm diameter.
- Turnbuckles should be of a type, which will allow visual inspection of the condition and extension of the threaded sections.
- The frame should be locked or moused (lashed) to the eyebolt to prevent slackening due to vibration, shock or spin in the line attached.
- Turnbuckles should be in accordance with *AS 2319 Rigging screws and turnbuckles*.

4.3.7 Temporary static lines (Horizontal Life Line Systems)

- A 16mm diameter nylon rope of kernmantle construction which complies with *AS 4142.3 Man-made fibre rope for static life rescue lines* and which provides a minimum safety factor of 10 may be used. The line must have a guaranteed breaking strain (GBS) of 80kN (approximately equivalent to 8 tonne).
- Tension may be achieved by a self-tensioning block that must be capable of automatically locking the line and manually releasing the line. Too much tension on the line will affect the overall strength of the system, too little will affect the ground clearance required.
- Shock absorption - the self-tensioning block must be designed to reduce shock loading by means of a dynamic friction facility which guarantees that the maximum force generated on the line will not be greater than 6kN (approximately equivalent to 600 kg).
- Line end (termination of temporary static line) should be secured by one of the following:
 - hand splice with thimble eye;
 - machine splice (ferrule); or
 - figure of eight knot.

The maximum span between anchor points for a temporary lifeline should be no greater than 4 metres unless specifically designed by an engineer to be longer. This is due to the dynamic sag factor of the temporary lifeline and should be taken into account when calculating maximum ground clearance (MGC) requirement for a fall arrest system.

Total fall distance is defined in *AS/NZS 1891.1* as the total distance a person is likely to fall during both the free and restrained parts of a fall, and including the maximum dynamic extension of all supporting components.

Designers of static lines should ensure the system is designed so that persons falling will not crash to the ground. Calculations should consider:

- tension on the line;
- shock absorber extension;
- personal energy absorber of the person's lanyard;
- slide of the "D" ring;
- the person's height.

The person's weight will have a significant effect on the sag of the line. Other factors to be considered include climate (temperature, wet or dry), type of knots and age of the system.

4.3.8 Harnesses, lanyards and equipment

Body type harnesses of the parachute type should be used. The harness should be connected to the lanyard or lifeline at the top dorsal (back) position. If a lifeline and rope-grab device is used on steeply sloping surfaces, the user needs to have the device located in front. This will allow safe manual operation of the mechanism.

WAIST TYPE BELTS AND SIT HARNESSSES MUST NOT BE USED AS A FALL ARREST SYSTEM

Anchor points shall not be sited below the attachment point of the harness, eg. dorsal position.

There should be a minimum of slack in the safety line between the person and attachment to the anchorage.

The fall arrest system should be so designed to limit a free fall to a maximum of 2 metres.

Lanyards must incorporate a shock absorber and be fitted with double action devices, and as an assembly must comply with AS 1891.

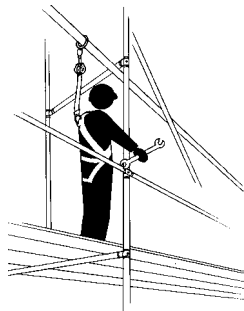


Figure 15

Scaffolders and riggers must have a safe system of work or use fall protection devices including harnesses and lanyards.

SNAPHOOKS WITHOUT A DOUBLE LOCKING DEVICE OR ACTION MUST NOT BE USED

In choosing the most appropriate fall arrest equipment for a particular application consideration must be given to any special requirements of the materials used in manufacture of the equipment.

When fall arrest equipment is used while operating chain saws, such as in tree pruning, trimming or removal operations, pole straps or belts should be steel core to prevent accidental cutting.

Equipment must be regularly inspected for signs of any damage from cutting or abrasion.

Workers using safety harnesses who are outside the safety of handrails must be attached to an anchor point or a fall arrest safety system at all times.

Workers using safety harnesses must not work alone. A worker suspended in a full body harness should be rescued as soon as possible. For this reason, workers should be capable of conducting a rescue of a fallen worker and be familiar with on site rescue equipment and procedures.

WHEN USING LANYARD OR ROPE SYSTEMS, THE EMPLOYER MUST HAVE IN PLACE A DOCUMENTED PROCEDURE FOR RESCUING WORKERS.

4.3.9 Self retracting lanyards

Self retracting lanyards can be used to prevent falls where work is carried out near an unprotected edge.

Self retracting lanyards 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 it to support the user during normal work.



Figure 16

Self retracting lanyards and safety harnesses can be used with a static line or fixed anchorages

Inertia reels may be less effective for certain applications, eg. stopping a person falling down an inclined surface. Inertia reels should be only sited from vertical to 45 deg. A site test should be carried out if it is to be used on a slope less than 45 degrees.

4.3.10 Pendulum effect

This is a potential hazard with the use of individual fall arrest systems.

Swing down

Swing down can occur if an inertia reel or work positioning device is extended diagonally so that the line makes an extreme angle with the perimeter edge of the structure.

In this situation, the forces generated in an arrested fall over the edge will cause the line to rotate back along the perimeter edge until it reaches a position directly in line with the anchorage point of the inertia reel and at right angles with the perimeter edge.

As the line moves back in this way, its unsupported section lengthens, thus dropping the attached worker further than the original (arrested) fall distance. If the length of the unsupported line equals the height of the building then the worker will hit the ground.

**THE “PENDULUM EFFECT” REQUIRES
CONSIDERATION PRIOR TO LOCATING THE
ANCHORAGE POINTS**

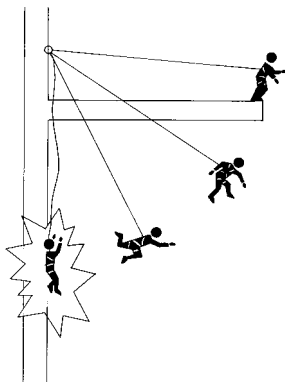


Figure 17

Swing back - in an arrested outward fall, particularly from a perpendicular edge, a person will swing back into the building structure and collide with any obstructions in the path of the swing. If this situation can arise, the use of an individual fall arrest system should be re-assessed

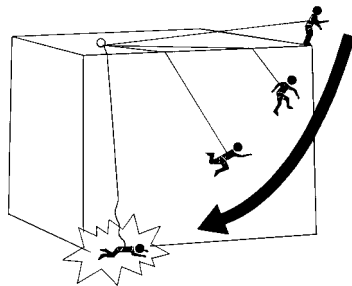


Figure 18

To eliminate the pendulum effect, place the anchorage point perpendicular to the position of the line at the perimeter edge. A mobile anchorage helps here. The use of second anchorages and belay devices is another way of minimising this effect.

Drop lines

Drop lines should be of a minimum knotted strength of 22kN (approximately equivalent to 2200 kg) and be of a nominal diameter of 11-12mm. They should have a fixed eye at one end for attachment to an anchor point or static line, and be knotted at the other end to stop a rope grab device from becoming detached. A drop line should be of kernmantle or 3 strand construction.

Vertical lifelines

Vertical lifelines (secondary safety line) - use vertical lifelines (droplines) in connection with work from a boatswain's chair or ladder. Only one person should be attached to any one lifeline.

Elevating work platform

Elevating work platform - a full body harness and fall arrest equipment must be worn where it is possible for an elevating work platform to invert or where it may be necessary to evacuate by means of an escape device

Light duty suspended stage

Light duty suspended stage (swing stage) - a safety harness and lanyard, attached to an independent anchored lifeline, should be worn by any person working in a swing stage suspended with one wire rope to each winch.

Where the swing stage is suspended by 2 wire ropes to each winch, a safety harness and lanyard should be attached to suitable steel components of the swing stage.

4.3.11 Training in the use of fall arrest systems

The training and instruction given should cover at least:

- the method to be used in carrying out the specified work task. This should include access and the attachment method;
- the correct use, care and storage of individual fall arrest equipment, its strengths and weaknesses and the siting of temporary fall arrest systems;
- inspection and maintenance of fall arrest equipment and recording information on a log card; and
- the procedure to be adopted in the event of an accident or injury (eg. rescue and recovery).

Records of this training must be kept.

4.3.12 Supervision of the use of fall arrest systems

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; and
- that adequate occupational safety and health systems are in place and functional and that safe work practices have been adopted and are used. This should include the use of fall arrest systems and devices.

4.3.13 Inspection of fall arrest systems

Fall arrest systems and devices have been covered in this code. Users must be aware that fall prevention depends upon the continued efficiency and durability of fall arrest systems and devices. It is essential a competent person maintain them correctly with inspections and examination of all components at regular intervals.

IF A FALL ARREST SYSTEM AND DEVICE HAS BEEN USED TO ARREST A FALL IT MUST BE WITHDRAWN FROM SERVICE AND INSPECTED BY A COMPETENT PERSON

Safety belts and harnesses that are not in regular use during any 6 month period should be inspected before use.

Fall arrest systems and devices should be inspected at least once every 12 months, and after any extended storage period.

An employer shall consult the manufacturer if there is any doubt that a belt or harness could be affected by cleaning materials, atmospheric contaminants or hazardous substances.

Guidance on the inspection of fall arrest systems and devices is given in Section 9 of AS 1891.4 *Industrial Fall-arrest Systems*. This includes anchorages which should be visibly checked prior to use.

Guidance on the inspection of belts and harnesses is given in Appendix A of AS 2626 *Industrial Safety Belts and Harnesses - Selection, Use and Maintenance*, and for self-locking safety anchorages in Appendix B of AS 2626. **All anchorages should be visibly checked prior to use.**

4.4 Ladders

The incorrect use of ladders is the cause of a large number of falls each year across all industry sectors. It is vitally important to ensure the ladder is set up on a level area and the base is located a distance from the wall approximately $\frac{1}{4}$ of the vertical height of the ladder.

Portable ladders

Ladders should be used as a means of access to or egress from a work area and not used as a platform. If it is necessary for a person to work from a ladder, for example to complete maintenance, monitor plant operation, service plant or for access to or egress from a work area, consideration should be given to:

- choosing the type of ladder appropriate to the task. Do not use “domestic” or “home made” type ladders. All portable ladders must comply with the appropriate Australian Standard;
- providing a slip resistant base, rungs or steps;
- wearing slip resistant shoes;
- when a person is stepping from the ladder ensuring that they have a firm and level work platform, free from obstructions to step onto;
- ensuring that the stiles of the ladder extend at least 1m above the stepping-off point and that the ladder is securely fixed. Sufficient platform area must be provided at the stepping off point;
- ensuring the ladder is the right height for the task to avoid reaching or stretching. Keep the body centred between side rails at all times;
- securing the ladder against displacement or having another person hold the base of the ladder;
- making sure all locking devices on the ladder are secure;
- using the ladder on firm, stable and level ground;

- ensuring that metal or wire bound ladders are never used close to energised power lines;
- ensuring the ladder is in good condition; and
- repairing ladders only in accordance with the manufacturer's specifications.



Figure 19
Correct arrangement of ladder. Base about 1 out from wall to 4 vertical height. Horizontal benching of ground ensures vertical alignment of ladder.



Figure 20
Instability. Base of ladder positioned too far from wall. Sudden slipping can occur.

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. Trestle ladders only shall be used to support any plank upon which a person has to work.

5. Controlling the risk of fall

5.1 Controlling the risk of fall through safety mesh

The required system for prevention of falls during sheet laying is permanent safety mesh securely fixed to the structure over the area to be roofed, in conjunction with appropriate edge and perimeter protection. This also offers long-term fall protection for maintenance workers.

Single unit domestic dwellings are exempt from this requirement.

5.1.1 Certification

The roofing contractor must be able to demonstrate that the mesh used meets the requirements for safety mesh outlined in AS/NZS 4389 -1996 *Safety Mesh* which replaces AS 1639 - *The Design and Installation of Corrugated Fibre - Reinforced Cement Roofing and Wall Cladding*. A manufacturers label indicating the product meets this standard is considered appropriate evidence of compliance.

5.1.2 Correct placement of mesh

Wires parallel to the direction of the corrugations of the sheeting (longitudinal wires) should be in contact with the tops of the immediate supports of the sheeting. Wires at right angles to the direction of the corrugations (transverse wires) should be on top of the longitudinal wires.

5.1.3 Installation

The mesh is first cut to length from the roll and run out over the roof using a continuous rope system. It can be installed safely from scaffolding positioned at each end of the roof.

The recommended method of fixing the mesh to metal purlins is to pass each longitudinal wire through a hole drilled in the top of the purlin and tie it off with at least four full turns around the wire as shown in Figure 22. If the mesh is to be fixed to timber purlins, use 40mm x 3.5 staples.

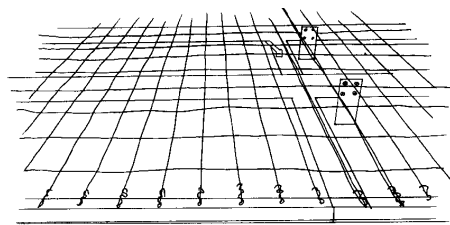


Figure 21

One satisfactory method for installation of the mesh, which is securely fixed to the purlins.

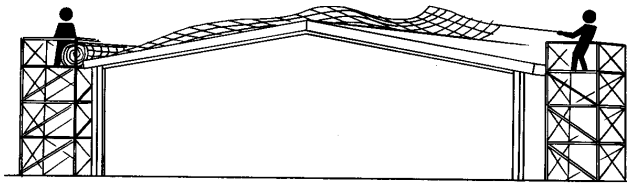


Figure 22
Means of installing safety mesh across the roof prior to fixing it in position.

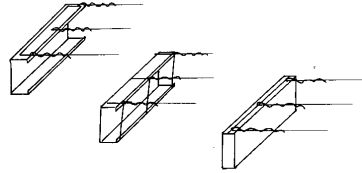


Figure 23
Means of fixing wire mesh to the purlins.

5.1.4 Side laps

The runs of mesh should be side lapped by at least 150 mm (one opening width). If the purlin spacing exceeds 1.5 metres, the runs of mesh should be side lapped by at least 300 mm of intermediate fixing with 2 mm staples.

Intermediate stapling of the mesh should be carried out from underneath.

5.1.5 End joins

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.

5.1.6 General

Mesh out all the roof framing that has been erected before loading the roof with bundles of decking.

Do not use the mesh for access or as a working platform. Workers should avoid walking or standing on the mesh.

Use scaffolding, scissor hoists, safety nets or individual fall arrest systems to protect workers installing the mesh.

Safety mesh, which is securely fixed, provides fall protection for roof installers and offers long term protection against falling for maintenance and repair workers. Safety mesh should be used in conjunction with appropriate edge protection, guard rails or fall arrest systems and devices.

Safety mesh must be installed by a competent person.

Persons engaged in the installation of safety mesh should be protected from falling by use of elevating work platforms and/or fall arrest systems and devices.

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

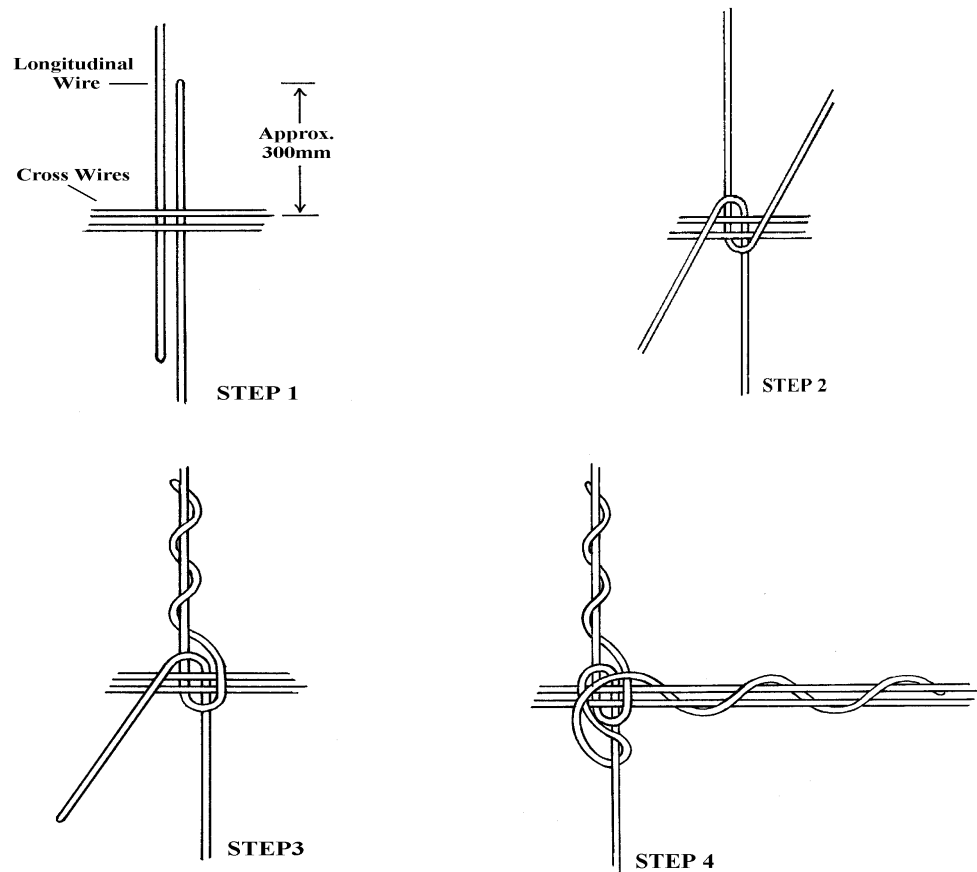


Figure 24
 Method for joining longitudinal wires and cross wires.

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

5.2 Working on or from fragile material

Always look out for hazards on both the upper and undersides of roofing materials.

Severe deterioration of roofing materials may not be readily apparent from the upper surface.

Where the work involves removal of a considerable amount of fragile material, fall arrest systems and devices should be worn by all personnel engaged in the work if:

- the perimeter of the roof is not guarded by any of the following:
 - a solid balustrade;
 - scaffolding; or
 - a guard rail, which extends not less than 900mm or more than 1100mm above the roof level at the perimeter, and includes a mid rail and fender board.

Safety harnesses should be attached by an individual fall arrest device to a static line positioned above the ridgeline or an individual anchorage point.

NO ONE SHOULD WALK DIRECTLY ON FRAGILE MATERIAL

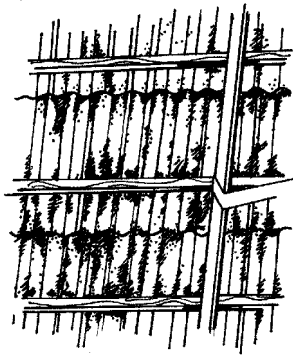


Figure 25
Inspect the underside of brittle roofing materials for hazards

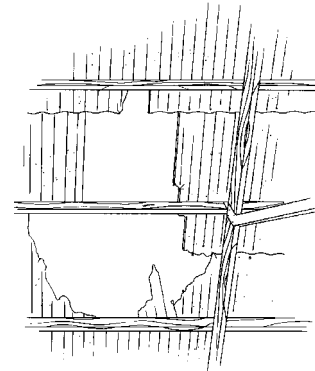


Figure 26
Broken sheets are a severe hazard. Many old roofs have no wire mesh under brittle sheets.

The employer, or the person who has control of the workplace, must ensure that no employee works in an area where there is the risk of falling due to the presence of fragile material unless:

- safe access to the work area is provided to enable employees to step directly onto a safe platform or area;
- work is carried out from a safe working platform that is located and constructed to allow work to be performed safely;
- warning signs are displayed at access points to any work area where fragile material is present; and
- warning signs are securely fixed in an upright position where they will be clearly visible to persons accessing the working area.



Figure 27
Danger signs to be fixed at points of access to the roof

Where it is necessary for maintenance or repairs to be carried out on an area containing fragile materials, the employer of those persons should:

- inspect the under-side of the work area to determine the extent of fragile material, presence of safety mesh, and the structural soundness of the work area and the safety mesh;

- provide temporary walkways as a means of access to and egress from any work area where permanent walkways are not provided;
- provide walkways at least 450mm in width with a guardrail. Where the slope of a walkway exceeds one vertical to six horizontal, timber cleats of not less than 50mm x 12mm should be fixed to the top side of the walkway planks at distances not more than 350mm apart, centre to centre. The walkway should be adequately secured;
- provide temporary roof ladders or crawl boards of sufficient strength where any person is required to carry out work on or adjacent to any part of a sloping roof sheathed in fragile material;
- provide individual fall arrest systems and devices for any person required to work on or adjacent to any fragile material, when safety mesh, safety nets or similar fall protection has not been provided; and
- provide training and instruction in the correct use of fall protection and ensure that employees understand the information.

6. Standards relevant to this code of practice

6.1 Australian Standards

AS 1319	Safety signs for the occupational environment
AS/NZS 1576	Scaffolding
AS 1657	Fixed platforms, walkways, stairways and ladders - Design, construction and installation
AS/NZS 1891	Industrial fall arrest systems and devices
AS/NZS 1892	Portable ladders
AS 2317	Collared eyebolts
AS 2319	Rigging screws and turnbuckles
AS 3569	Steel wire ropes
AS 4142.3	Man-made fibre rope for static life rescue lines
AS 4256.2	Plastic roof and wall cladding materials – Unplasticized polyvinyl chloride (uPVC) building sheets
AS 4389	Safety Mesh
AS /NZS 4488	Industrial rope access systems
AS/NZS 4576	Guidelines for scaffolding

6.2 British Standards Institution

BS 3913	Specification for industrial safety nets
BS 5845	Permanent anchors for industrial safety belts and harnesses

7. Further information

Further information on the provisions of this approved code of practice or any other occupational health and safety issues can be obtained from NT WorkSafe at one of the offices listed below –

Darwin

Ground Floor, Minerals House
66 The Esplanade
DARWIN NT 0800

GPO Box 4160
DARWIN NT 0801

Freecall: 1800 019 115
Telephone: (08) 8999 5010
Facsimile: (08) 8999 5141
Email: ntworksafe.deet@nt.gov.au
Website: www.worksafe.nt.gov.au

Katherine

Ground Floor, NTG Centre
First Street
KATHERINE NT 0850

PO Box 529
KATHERINE NT 0851

Telephone: (08) 8973 8416
Facsimile: (08) 8973 8930

Alice Springs

Peter Sitzler Building
67 North Stuart Highway
ALICE SPRINGS NT 0870

PO Box 2134
ALICE SPRINGS NT 0871

Telephone: (08) 8951 8682
Facsimile: (08) 8951 8618