



WORK SAFELY AT HEIGHTS

LEARNER GUIDE

TABLE OF CONTENTS

1.1 Working At Heights	4
1.1.1 How Can We Work Safely At Heights?	5
1.2 Legislation, Regulations And Safety Requirements	6
1.2.1 What Is Compliance Documentation?	6
1.2.2 OHS/WHS Legislation And Regulations.....	6
1.2.3 Codes Of Practice and Australian Standards.....	6
1.2.4 Organisational And Site Requirements	6
1.2.5 Manufacturers' Guidelines And Specifications	6
1.2.6 Environmental Protection Requirements.....	7
1.2.7 Specific OHS/WHS Requirements For Work At Heights	7
1.3 Access Technical And Safety Information Before you Start	8
2.1 Identify Scope Of Task And Work Activities	8
2.2 Manage Hazards	11
2.2.1 Inspecting The Site For Hazards.....	11
2.2.2 Risk/Hazard Assessment.....	14
2.2.3 Risk/Hazard Treatment	14
2.2.4 Reporting And Record Keeping.....	15
3.1 Safety Systems And Equipment	15
3.1.1 Fall Prevention Devices.....	17
3.1.1.1 Temporary Work Platforms.....	17
3.1.1.2 Edge Or Perimeter Protection Systems (Guard rails)	23
3.1.1.3 Fall Protection Covers And Safety Mesh	24
3.1.2 Work Positioning Systems.....	25
3.1.2.1 Industrial Rope Access Systems.....	26
3.1.2.2 Restraint Work Positioning Systems	27
3.1.3 Fall-Arrest Systems.....	28
3.1.3.1 Catch Platforms And Safety Nets.....	28
3.1.3.2 Individual Fall-Arrest Systems.....	29
3.1.4 Ladders	34
3.1.4.1 Anchorage lines or Rails	35
3.1.5 Personal Protective Equipment.....	36
3.1.6 Communication Techniques And Equipment	36
3.2 Checking Equipment Before Use	36
3.2.1 Inspecting Fall Arrest Harnesses	37
3.2.2 Inspecting Inertia Reels.....	38
3.2.3 Inspecting Ladders.....	39
3.3 Installing Safety Systems and Equipment	40
3.3.1 Installing A Safety Net.....	40
3.3.2 Installing Fall-Arrest Systems	41
3.3.2.1 Installing Anchorages And Lines.....	41
3.3.2.2 Limiting Free-fall Distance In Fall-Arrest Systems	42
3.3.2.3 Monitoring Of Fall-Arrest Systems	44

4.1 Safely Access Work Area	45
4.1.1 Using Portable Ladders To Gain Access.....	46
4.1.2 Connecting To The Fall-Arrest System	47
4.2 Conduct Work At Heights Safely	48
4.2.1 Checking Weather Conditions.....	49
4.2.2 Handling And Securing Equipment And Materials.....	50
4.3 Monitor Safety Equipment And Risk Treatments	52
4.3.1 Monitoring Equipment And Safety Systems	53
4.3.2 Monitoring And Adjusting Risk Treatments	53
4.4 Emergency Procedures	54
4.4.1 Suspension Intolerance.....	55
4.4.1.1 Preventing Suspension Intolerance	56
4.4.1.2 First Aid For Suspension Intolerance	57
4.4.2 Report All Hazards, Incidents And Injuries.....	58
4.5 Finalise Operations	59
4.5.1 Dismantling Safety Systems.....	59
4.6 Clear Work Area And Store Tools And Equipment	59
4.6.1 Clearing The Work Area.....	59

1.1 WORKING AT HEIGHTS

Working at heights includes any situation where a worker, or other nearby person, is exposed to a risk of falling (from one level to another) that is likely to cause injury to the worker or person.



Generally this includes:

- ▶ Work conducted in or on plant or a structure that is at an elevated level.
- ▶ Work conducted in or on plant that is being used to gain access to an elevated level.
- ▶ Work conducted near an opening through which a person could fall.
- ▶ Work conducted near an edge over which a person could fall.
- ▶ Work conducted on or near a surface through which a person could fall.
- ▶ Work conducted on or near a slippery, sloping or unstable surface.

Wherever possible, the need to work at heights should be eliminated, however if this option is not reasonably practicable the Code of Practice 'Managing the Risk of Falls at Workplaces' outlines the steps that should be taken to minimise the risk involved.

Any work that must be conducted at heights requires adequate training, instruction and the employment of a system of fall protection.



1.1.1 HOW CAN WE WORK SAFELY AT HEIGHTS?



Working at heights is by nature a hazardous practice. The risk of injury or death to either workers or other people in the area is a serious concern.

Every year people are injured or even killed when they fall from a height or are hit by equipment or materials falling on them from above.

Working safely at heights requires careful planning and consideration, as well as the implementation of hazard controls/treatments to eliminate or minimise the risks of falls.

It is very important that all risks are identified and controlled and that appropriate safe work practices and training are applied to make sure that all people in the work area are kept safe.

In order to work safely at heights you must make sure you have properly planned the work to be completed.

Therefore we can conduct work at heights safely by:

1. Planning the work.
2. Identifying hazards/risks.
3. Implementing hazard/risk treatments.
4. Working in accordance with:
 - ▶ Procedures (site and equipment).
 - ▶ Regulations.
 - ▶ Codes of practice.
 - ▶ Australian Standards.



1.2 LEGISLATION, REGULATIONS AND SAFETY REQUIREMENTS

Refer to Trade basics training

1.2.1 WHAT IS COMPLIANCE DOCUMENTATION?

Refer to Trade basics training

1.2.2 OHS/WHS LEGISLATION AND REGULATIONS

Refer to Trade basics training

1.2.3 CODES OF PRACTICE AND AUSTRALIAN STANDARDS

Refer to Trade basics training

1.2.4 ORGANISATIONAL AND SITE REQUIREMENTS

Refer to Trade basics training

1.2.5 MANUFACTURERS' GUIDELINES AND SPECIFICATIONS



These requirements will be documented in operator's manuals, equipment specifications and work instructions.

Designers and manufacturers have a responsibility to ensure that structures, plant and equipment meets strict criteria for the safe operation and protection of workers while also meeting relevant environmental standards.

Recent cases have occurred where designers and manufacturers have been prosecuted for not adequately catering for health and safety or environmental requirements.

Where design faults or obvious environmental risks are present in equipment or in the deliberate use of such equipment, the manufacturer and the employer/PCBU can be held liable for any incidents that may arise.



1.2.6 ENVIRONMENTAL PROTECTION REQUIREMENTS

Refer to Trade basics training

1.2.7 SPECIFIC OHS/WHS REQUIREMENTS FOR WORK AT HEIGHTS

Specific legislative and OHS/WHS requirements for your worksite may cover such areas as:

- ▶ **Emergency procedures**, including extinguishing fires (e.g. use of fire-fighting equipment), organisational first aid requirements (e.g. use of first aid equipment) and evacuation.
- ▶ **Rescue procedures**, especially in the case of minimising suspension intolerance.
- ▶ **Hazard treatments** specific to work conducted at heights.
- ▶ Handling of **hazardous materials** and substances.



- ▶ **Safe operating procedures.**
- ▶ **Personal protective clothing and equipment** prescribed under legislation, regulations and workplace policies and practices.
- ▶ **Use of tools and equipment.**

1.3 ACCESS TECHNICAL AND SAFETY INFORMATION BEFORE YOU START

Refer to Trade basics training

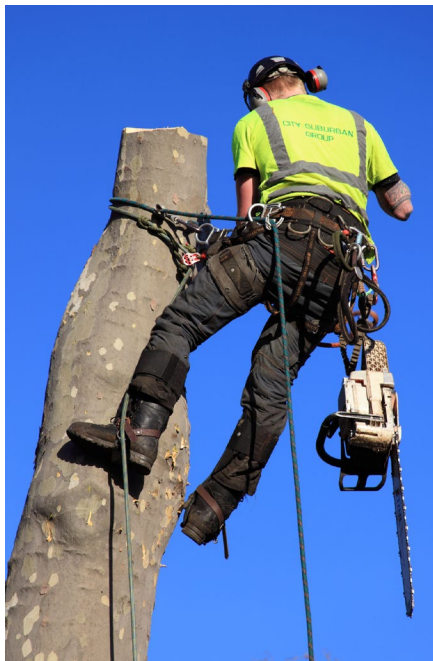
2.1 IDENTIFY SCOPE OF TASK AND WORK ACTIVITIES

In planning your work it is important to identify and document the scope of the tasks and the proposed safe work practices and activities you will undertake to complete them.



The work done at heights will involve personnel operating in dangerous elevated positions. This can include working on or around:

- ▶ Bridges, e.g. inspection and maintenance.
- ▶ Buildings, e.g. maintenance, window cleaning, demolition work.
- ▶ Roofs, e.g. maintenance, installing television aerials, placing insulation.
- ▶ Openings in and open edges of floors or walls.
- ▶ Unguarded shafts or excavations.
- ▶ Scaffolds.
- ▶ Elevated work platforms (EWP).
- ▶ Vehicles and other plant.



- ▶ Unguarded platforms and walkways.
- ▶ Order picking forklifts.
- ▶ Forklift platforms.
- ▶ Ladders.
- ▶ Temporary or permanent unstable structures.
- ▶ Fragile or brittle surfaces, e.g. skylights.
- ▶ Places where someone could fall into water, acid or poisonous solutions.
- ▶ Places where someone could fall onto sharp or projecting objects, e.g. a picket fence.
- ▶ Anywhere tools, equipment or material could be dropped onto someone below.

Work at heights may involve many different tasks such as:

- ▶ Construction.
- ▶ Maintenance or repair.
- ▶ Cleaning.
- ▶ Painting.
- ▶ Installation of equipment, systems or plant.
- ▶ Disassembly of structures, plant, equipment or systems.
- ▶ Rescue operations.
- ▶ Roof construction, skylight installation or maintenance.



2.2 MANAGE HAZARDS

2.2.1 INSPECTING THE SITE FOR HAZARDS

It is important that you examine the entire work area. This will include not only the area at height but also anywhere above or below it. Hazards you would look for include:

Surfaces	Is it unstable, slippery, busy, structurally unsound or sloping?
Structures	Are they unstable or incomplete?
The ground	Is it uneven or unstable?
The work area in general	Is it crowded or cluttered? Is there plant, equipment, tools, rubbish, workers or other obstructions in the area? Are there hazardous materials, or other hazards specific to the work site or tasks being completed in the area? Is there a chance of falling objects? Is there adequate lighting?
Access and egress from the work location	Is there safe, adequate access to and from the work area?
Unprotected edges	Are there unprotected edges of floors, working platforms, walkways, walls or roofs?
Environment	Is bad weather predicted (e.g. storms and rain)? Are there excessive temperatures (hot and cold) to consider? Are there UV hazards? Are there atmospheric hazards such as dust, vapours, moisture or noise?



You also need to be aware of manual handling hazards such as:

- ▶ Inappropriate carrying of materials on ladders.
- ▶ Excessive bending or twisting in different work situations.
- ▶ Incorrect use of ladders.
- ▶ Clothing 'catching'.
- ▶ Loss of hand grip.



- ▶ Moving from one surface to another.



Sometimes it may be the amount of time a worker is exposed to a particular situation that creates a hazard.

This may depend on the physical condition, experience or training of the worker and may create more risk to one person than another.

For instance, long-term exposure to sunlight or heat may cause a worker to become dizzy.

Part of your site inspection will include the identification and management of potential risks and hazards. You will also need to report them to the appropriate personnel, such as your supervisor, worksite manager or OHS/WHS officer.



2.2.2 RISK/HAZARD ASSESSMENT

Refer to Trade basics training

2.2.3 RISK/HAZARD TREATMENT



Once risks have been identified, analysed and evaluated, risk treatment options need to be considered and applied.

Risk treatment involves selecting one or more options to modify a risk and then implementing the selected option/s.

There are a number of ways to control the risks of falls.

Some control measures are more effective than others.

Applying Isolation Procedures

Hazards such as electrical service lines may need to be isolated before work commences.

A typical isolation procedure may consist of the following:

1. Power sources are identified and isolated. Electrical equipment should be shut off at the main isolator not just by way of a stop button.
2. Isolating points are locked/secured with padlocks and danger tags.
3. All stored energy is dispersed.
4. Isolation is checked for effectiveness.
5. Safe area of work is identified.





When using locks and danger tags remember that:

- ▶ Tags should be dated and signed.
- ▶ Locks should have a tag giving the name of the person who locked out the plant.
- ▶ Tags and locks should only be removed by the person who applied them (or an authorised person).
- ▶ Tags and locks should be fitted to all isolation points.

The scope of tasks and the safe work practices you are going to apply should be referred to, and documented, when completing Safe Work Method Statements.

2.2.4 REPORTING AND RECORD KEEPING

Refer to Trade basics training

3.1 SAFETY SYSTEMS AND EQUIPMENT

Safety systems and equipment are used to access work areas safely, stop workers, tools or materials from falling, or for safely arresting the descent of workers.

Safety systems and work at heights equipment include:



4. Ladders:

1. Fall prevention devices:

- ▶ Temporary work platforms.
- ▶ Guard rails.
- ▶ Safety mesh.

2. Work positioning systems:

- ▶ Industrial rope access systems.
- ▶ Restraint systems.

3. Fall-arrest systems:

- ▶ Catch platforms
- ▶ Safety nets.
- ▶ Individual fall-arrest systems.
- ▶ Anchorage lines and rails.



- ▶ Portable ladders.
- ▶ Fixed ladders.

It is essential that all safety systems and their components are inspected and installed by a competent person to ensure that:

- ▶ They are adequate for the task.
- ▶ They conform to OHS/WHS regulatory requirements and worksite policy.

This includes the fitting, adjusting and anchoring of fall protection equipment.



3.1.1 FALL PREVENTION DEVICES



Wherever possible the need to perform work at heights should be avoided completely, however if this is not reasonably practicable, fall prevention devices provide the best protection against falls by working to minimise the chance of a fall ever occurring.

Fall prevention devices include:

- ▶ Temporary work platforms.
- ▶ Edge or perimeter protection systems.
- ▶ Fall protection covers and safety mesh.

3.1.1.1 TEMPORARY WORK PLATFORMS

A work platform should be fixed to a structure for stability and installed with edge protection. It should be fitted so that it can be accessed and exited safely.

The surface should be non-slip, large and strong enough to safely support all the tools, materials and people placed upon it. It should not be fixed at a steep angle.

Work platforms include:

- ▶ Scaffolding (e.g. mobile, tower, suspended).
- ▶ Elevating work platforms (e.g. boom type, scissor lift or hydraulic lift).
- ▶ Mast Climbers.
- ▶ Workboxes (crane or forklift lifted).



Scaffolding

When using scaffolding make sure that:

- ▶ Any scaffold from which a person could fall more than 4 m is prepared and erected by a licensed scaffolder.
- ▶ It complies with Australian Standards AS/NZS 1576 and AS/NZS 1577.
- ▶ It is equipped with guardrails and kickboards (toeboards).
- ▶ Mobile scaffolding is level, the wheels/casters are locked while in use, they are positioned safely away from any edges that may collapse under the weight of the scaffold and equipment, and they are not moved with someone on it.



Whenever you are working on a scaffold make sure you work in accordance with site procedures and the manufacturer's specifications. Also ensure you know the duty (capacity) of the scaffold and that it is completed and ready for use.



Elevating Work Platforms (EWPs)

Elevating work platforms (EWPs) are available in a variety of types and sizes such as boom type, scissor lifts and vertical mast.

When using an EWP it is important that:

- ▶ Operators wear a safety harness attached by a lanyard (with energy absorber) of appropriate length to a suitable anchorage point on the platform.

- ▶ The operator is adequately trained to use the EWP. A license is required for the operation of boom type EWPs where the boom length is 11 metres or more.
- ▶ The use of the EWP should comply with the Australian Standard AS 2550.10 Cranes – Safe Use – Elevating work platform.
- ▶ The EWP has been checked to make sure it is in safe working order.



Mast Climbers

Mast climbers are made up of work platforms that are raised and lowered along 1 or more masts using a hoist mechanism.

They may need to be tied to a building under circumstances prescribed by the manufacturer to make sure they remain stable during use.

Mast climbers are generally not suitable for use if the profile of a structure changes at different elevations (e.g. if the upper floors of a building 'step' back or balconies extend from the building).



The erection and dismantling of mast climbing work platforms must be carried out, or be directly supervised, by a person holding an appropriate high risk rigging or scaffolding licence.

Further information on mast climbing work platforms is provided in AS 2550.16 *Cranes—Safe Use—Mast climbing work platforms*.

Crane Lifted Personnel Boxes/Workboxes

Personnel boxes or workboxes are used to lift workers with a crane.

Crane-lifted workboxes are often suitable for very high work or isolated parts of the project where it is difficult or impractical to provide scaffolds or EWPs.

The workbox must be specifically designed for the purpose of lifting people. Its design must be registered with a State or Territory regulatory authority and meet all of the necessary requirements of the workplace, crane manufacturer and AS 2550 and AS1418.17.

The workbox and workers must be securely attached to an approved anchor point (capable of withstanding the force of the box falling). Workers should be attached via a lanyard and full body harness, unless the workbox is enclosed.



The workbox must be stamped or be provided with a stamped metal data plate, securely and permanently attached to it in a prominent position, and providing the following information:

- ▶ The maximum hoisted load (kilograms).
- ▶ The safe working load (kilograms).
- ▶ The tare mass (kilograms).
- ▶ Minimum allowable (rated) crane capacity (kilograms).

Forklifts And Forklift Work Platforms

Order picking forklift trucks are most commonly used for stock picking.

They are designed to be operated on flat level surfaces and must not be used on rough terrain.

A safety harness with lanyard is required to reduce the risk of a fall from height.



Forklift work platforms are designed to lift people with a forklift. Make sure when using a forklift work platform that:

- ▶ Workers NEVER stand on forklift tynes, pallets or in unsuitable lifting cages.
- ▶ The work platform is designed and operated in line with the Australian Standards AS 2359.1 and AS 2358.2.
- ▶ The work platform is securely attached to the forklift.
- ▶ The forklift operator remains seated at the controls of the forklift at all times while someone is elevated in the work platform.
- ▶ The forklift does not travel while someone is in the work platform.
- ▶ The load capacity of the platform is never exceeded.
- ▶ No ladders or other means are used within the workbox to gain extra height.



3.1.1.2 EDGE OR PERIMETER PROTECTION SYSTEMS (GUARD RAILS)

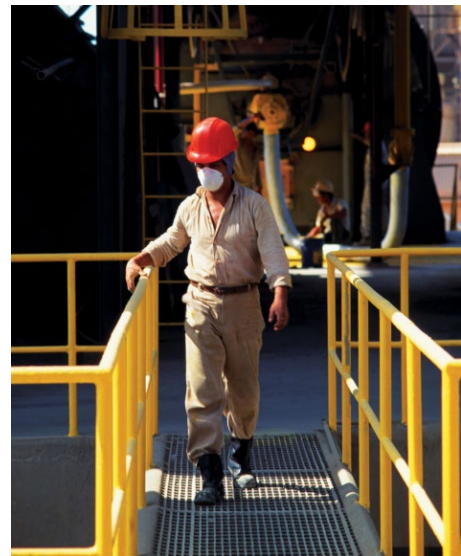


An edge or perimeter protection system is a barrier placed around the edge of a structure, building or gap to prevent people and/or objects from falling over the edge of a working surface.

It can include handrails or containment sheeting, guardrails, mid-rails and kickboards (toe boards).

The code of practice 'Managing the risk of falls at workplaces' states that guard rails should be used:

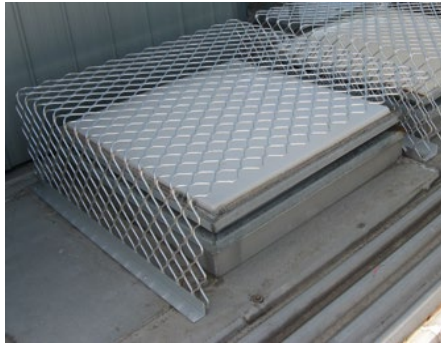
- ▶ *At the edges of roofs.*
- ▶ *At the edges of mezzanine floors, walkways, stairways, ramps and landings.*
- ▶ *On top of plant and structures where access is required.*
- ▶ *Around openings in floor and roof structures.*
- ▶ *At the edges of shafts, pits and other excavations.*



Handrails, mid-rails and kickboards (toe boards) should not be further than 100mm outside the edge of the working surface they run parallel to.

The guard rail must be placed at a height of 900mm to 1100mm above the working surface with the mid-rail secured halfway between the guardrail and the working surface. The kickboard must be fixed to the working surface and should extend at least 150 mm above it.

3.1.1.3 FALL PROTECTION COVERS AND SAFETY MESH



Fall protection covers are placed over openings and holes such as skylights to prevent falls. They are usually made of timber, metal or wire mesh.

They should be securely fixed and strong enough to take the impact of a falling person.

Signage should be used in conjunction with a fall protection cover to warn people that there is an opening or hole underneath.



Safety Mesh



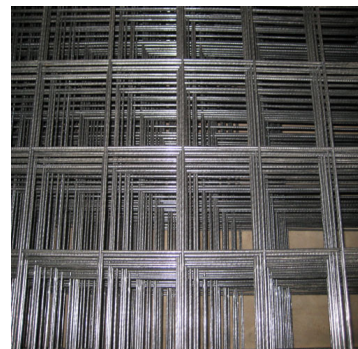
Safety mesh is designed to prevent internal falls through a roof.

When correctly installed, safety mesh provides fall protection for roof installers, maintenance and repair workers.

It is important to note that safety mesh does not prevent falls from the edge of a roof, or through holes in a roof. Safety mesh should always be used with other fall prevention systems and equipment such as edge protection, guard rails or fall-arrest systems.

Safety mesh should comply with AS/NZS 4389 Safety mesh:

Safety mesh should be formed from 2 mm diameter wire of not less than 450 MPa tensile strength, welded into a mesh with the longitudinal wires not more than 150 mm apart and the cross wires not more than 300 mm apart.



3.1.2 WORK POSITIONING SYSTEMS

A work positioning system uses equipment to allow a worker to carry out a task while being supported in a harness (in tension) to prevent a fall.

This can include:

- ▶ Industrial rope access systems – these allow a worker to be vertically suspended to access a work area (such as the side of a building).
- ▶ Restraint systems – these make use of a lanyard and an anchor point or horizontal life line (static line).

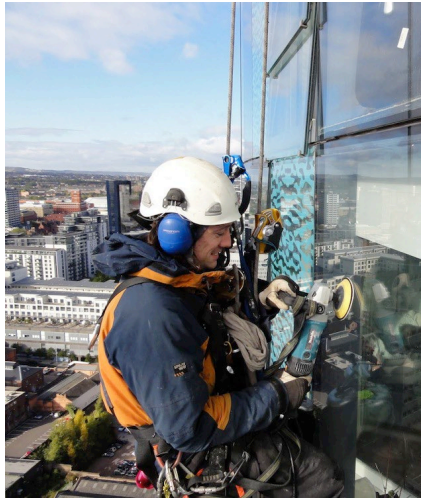


It is always better to prevent the possibility of a fall than simply providing a fall arrest system because of the serious dangers resulting from a worker being suspended in a harness for too long before rescue (e.g. suspension intolerance).

Work positioning systems require a high level of competency on the part of the user and supervisors to ensure safe use.

Users, including supervisors, should undertake a competency based course of training.

3.1.2.1 INDUSTRIAL ROPE ACCESS SYSTEMS



Industrial rope access systems are used for gaining access to and working at a workplace, usually by means of vertically suspended ropes.

Other methods of reaching the work area should always be considered before using an industrial rope access system, for example an elevating work platform.

The code of practice 'Managing the risk of falls at workplaces' states that when using an industrial rope access system you must ensure that:

- ***Operators are competent in the technique.***
- ***Operators do not work alone and must be able to communicate with supervisors.***
- ***Industrial rope access systems are installed only in a location where it is possible to provide prompt assistance or rescue if required.***
- ***All equipment and anchor points are checked regularly by a competent person.***
- ***A back up system is used to protect the operator and two independently anchored ropes are used for each person.***
- ***Adequate safety equipment must be provided including a full body harness.***
- ***Adequate signage and barricades must be used to keep the area below the worker, and the point of anchorage clear.***

For more information on industrial rope systems please refer to AS/NZS 4488 Industrial rope access systems.



3.1.2.2 RESTRAINT WORK POSITIONING SYSTEMS



Restraint systems control a worker's movement by physically preventing the person from reaching a point where they could fall such as an unprotected edge.

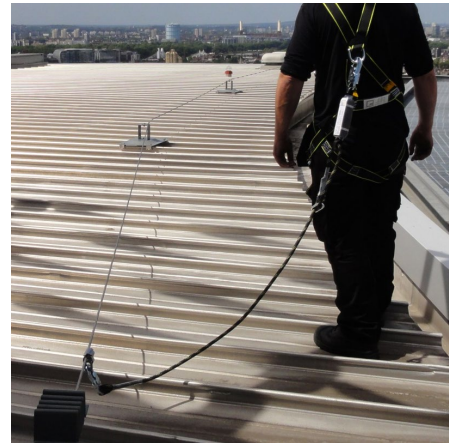
These systems should only be used where it is not reasonably practicable to provide a barrier or guardrail at an unprotected edge.

Restraint systems are made up of a harness that is connected to an anchor point or static line via a lanyard. The anchor point should be designed for fall-arrest loading.

This system is suitable:

- ▶ Where workers can maintain secure footing.
- ▶ Where a shock absorber is used in the configuration.

Restraint systems should be installed by a competent person in accordance with the manufacturers instructions and AS/NZS 1891 Industrial fall-arrest systems and devices.



The code of practice 'Managing the risk of falls at workplaces' states that an individual fall-arrest system should be used instead of a restraint system in the following situations:

- ***The user can reach a position where a fall is possible.***
- ***The user has a restraint line that can be adjusted in length so that a free fall position can be reached.***
- ***There is a danger the user may fall through the surface, for example fragile roofing material.***
- ***The slope is over 15 degrees.***
- ***There is any other reasonably likely use or misuse of the system that could lead to a free fall.***

3.1.3 FALL-ARREST SYSTEMS

Fall-arrest systems are designed to prevent a worker or materials that has fallen from an edge, making contact with the level below.

These systems include:

- ▶ Catch platforms.
- ▶ Safety nets.
- ▶ Individual fall-arrest systems.



3.1.3.1 CATCH PLATFORMS AND SAFETY NETS



Catch platforms and safety nets are temporary structures installed below a work area to catch a worker if they fall or to catch falling objects.

They should be strong enough to take the impact of people, equipment and materials.

Industrial safety nets are sometimes used as an effective means of fall protection for those working at heights where it is not practicable to provide scaffolds or temporary guard railings.

When combined with overlay nets of finer mesh size, they can also be used to contain falling debris.



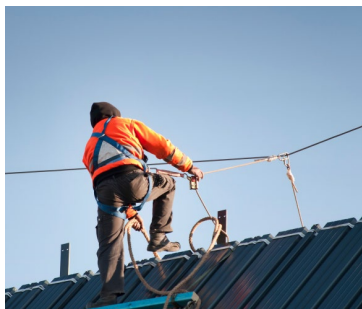
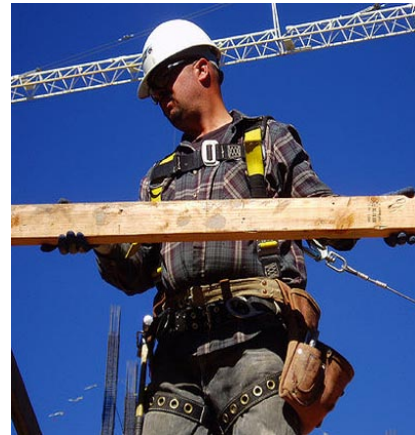
3.13.2 INDIVIDUAL FALL-ARREST SYSTEMS

A fall-arrest system is designed to safely stop a worker falling an uncontrolled distance and to reduce the impact of the fall.

Fall-arrest systems must only be considered where higher level control measures are not reasonably practicable.

A fall-arrest system may include:

- ▶ Anchorages.
- ▶ Life lines and static lines.
- ▶ Inertia reel.
- ▶ Lanyard of fixed length.
- ▶ Retractable lifelines.
- ▶ Rope grabs.
- ▶ Wire grabs.
- ▶ Rail system.
- ▶ Shock absorbers, both personal and industrial.
- ▶ Harness.
- ▶ Snap hooks (double or triple action to prevent rollout).
- ▶ Karabiners (double or triple action to prevent rollout).
- ▶ Rescue equipment.



Always select compatible components (parts) whenever preparing for work at heights.

The use of non-compatible components may lead to malfunction of the equipment, resulting in accidents, injury or death.

If you are not sure if the components of a fall-arrest system are compatible you should check with the manufacturer.

Anchor Points



Each anchorage point should comply with the requirements in *AS/NZS 1891.4 Industrial fall-arrest systems and devices – selection, use and maintenance*.

Anchorage are required, under AS/NZS 1891.4, to have a minimum breaking strength of 15kN (1500kg) for 1 person attached. An anchorage rated to greater than 21kN (2100kg) is suitable for use by no more than 2 people.

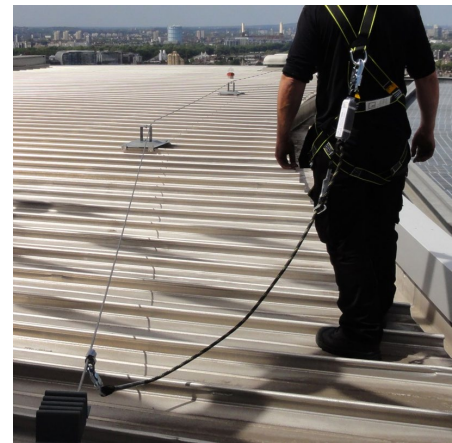
All anchorages should be tested and approved by a competent person before use—a visual inspection may not reveal the structural integrity of the anchor point (i.e. the bolt may have failed below the concrete surface).

Life Lines and Static Lines

Life lines and static lines are horizontal or substantially horizontal lines to which a lanyard may be attached and which is designed to arrest a free fall.

These provide a suitable anchor point for a fall-arrest system, while still allowing a limited range of movement along the path of the line.

These lines must be installed and checked regularly by a competent person and must only be used in accordance with the manufacturers specifications, including limits relating to the number of workers connected to the line at one time.



Wherever possible life lines and static lines should be as high as the situation safely allows to limit the free-fall distance of workers connected to it.

Life and static line anchors must be rated appropriately for the situation and number of workers.

Fall-Arrest Harnesses

In most cases of working at heights a full body harness should be worn.

Harnesses must be correctly fitted in accordance with manufacturers instructions to ensure effectiveness.

Workers should connect the fall-arrest line to the attachment point on their harness (dorsal attachment point in the middle of the back, or the chest connection) that will provide the best protection in the situation it is being used.

Safety harnesses must meet the requirements of AS/NZS 1891 Industrial fall-arrest systems and devices.



Lanyards



There should be a minimum of slack in the fall-arrest lanyard between you and the anchor point, which should be as high as the equipment permits.

The length of the lanyard should restrict the fall distance to a maximum of 2 metres before the fall arrest system takes effect.

Avoid work above the anchor point, as this will increase the free fall distance in the event of a fall, resulting in higher forces on the body and greater likelihood of the lanyard snagging on obstructions.

To reduce injuries caused by a fall, energy absorbers should be used as part of the lanyard.

Inertia Reels

Inertia reels provide a worker with a relatively free range of movement or extra reach compared to a lanyard, with the added safety feature of being able to lock in the event of a fall, arresting the descent of the worker.



Inertia reels should not be used in the following situations:



- ▶ While working on a sloped surface (e.g. a steeply pitched roof) or any other surface where a fall may not be a quick vertical one.
- ▶ Locked as a constant support for a worker during normal work.
- ▶ In conjunction with a lanyard.

Inertia reels must comply with AS 1891.3 *Fall arrest devices*.

Swing Down and Swing Back – The Pendulum Effect

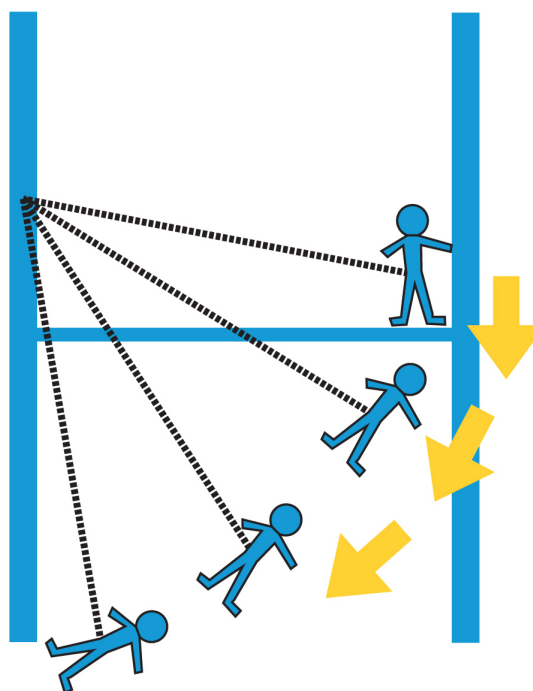
If a worker who is using an individual fall-arrest system falls from an edge, the system may act as a pendulum.

This may result in the worker hitting the ground (called 'swing down') or swinging back into the building or structure (called 'swing back').

These situations may also be referred to as 'the pendulum effect'.

Swing down can occur if the lanyard slides back along the perimeter edge of the roof as a worker falls, until it is vertical.

When this happens, the worker may hit the ground (or lower level), or the lanyard may break from being dragged across the edge of the roof.



The code of practice 'Managing the risk of falls at workplaces' lists the following measures to address 'swing down':

- ▶ *The installation of guard rails.*
- ▶ *Placing the anchorage point at a right angle to the position of the lanyard at the perimeter edge (for example, by using a mobile anchorage).*
- ▶ *The installation of a second anchorage point and belay devices (intermediate anchorages).*

3.1.4 LADDERS

Ladders should be considered as a primary means of access and egress to a work area, but should not be your first option for conducting the work at heights.

Many falls take place while people are working from ladders, therefore any work should be limited to light work of a short duration that can be carried out safely while on the ladder.

Elevating work platforms or scaffolds are a safer and more efficient option.

Portable ladders are available in two grades – industrial and domestic. All work carried out at heights should use a ladder that is rated to 120kg and is manufactured for industrial use.

Never use a domestic grade ladder for industrial use because it is not required to be as robust and strong as an industrial grade ladder.



When selecting a ladder for use, make sure it is in good condition. Check for faults, such as broken rungs, stiles and footing before you use it.

Guidance on the selection, safe use and care of portable ladders is set out in AS/NZS 1892 Portable ladders series.

The manufacturer's recommendations on safe use should also be followed.

Ladder Access or Egress:

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

- ***There is a firm, stable work platform, free from obstructions, to step onto from the ladder.***
- ***The ladder extends at least one metre above the stepping-off point on the working platform.***
- ***Fall protection is provided at the stepping-off point where people access the working platform.***

3.1.4.1 ANCHORAGE LINES OR RAILS

Anchorage lines or rails can be temporary or permanent fall-arrest systems.

They are designed to provide continuous fall protection for workers using ladders or climbing towers on plant (e.g. tower cranes) as well as buildings or structures.



Safety considerations include that:

- ▶ The locking device is attached to the front of the harness.
- ▶ The lanyard (including all components/parts) is a maximum of 30 cm length.
- ▶ The point of connection onto the line or rail system is near the base of the ladder where a worker can safely access it before climbing up.
- ▶ The system must provide continuous connection all the way to the top (disconnecting point).
- ▶ Free fall is limited to a maximum of 60 cm.
- ▶ Permanent systems must be made of wire or rail construction and installed according to the manufacturer's instructions.

If a fall occurs, the system must be removed and inspected by a competent person before it can be re-installed and used again.

Temporary anchorage line or rail systems must comply with AS/NZS 1891.



3.1.5 PERSONAL PROTECTIVE EQUIPMENT

Refer to Trade basics training

3.1.6 COMMUNICATION TECHNIQUES AND EQUIPMENT

Refer to Trade basics training

3.2 CHECKING EQUIPMENT BEFORE USE



Before you use any equipment (including safety equipment), tools or plant you **MUST** check that they are in safe working order.

Common faults and checklists or inspection techniques will be outlined in your worksite procedures and also in the operator's manual for each tool or piece of equipment.

The manual will contain the manufacturer's instructions and specifications for inspecting, using, cleaning, maintaining and storing the item.

They will also explain its capabilities and limitations.



If you find anything wrong during your checks you need to:

- 1** Tag and isolate the damaged or defective item to stop anybody using it.
- 2** Record the problem in the logbook or on the inspection checklist, giving as much detail as possible.
- 3** Report the fault to your supervisor or another authorised person.

3.2.1 INSPECTING FALL ARREST HARNESES

Any harness equipment should be checked using a detailed inspection checklist, as outlined in AS/NZS 1891.4 'Industrial fall arrest systems and devices' (see Appendix 3A for a checklist that you may use).

It is extremely important that all harnesses are checked before use.

Consider that this is one of the most important pieces of equipment in catching you if you fall.

Company Name:		Date:	Satisfactory	
			✓	✗
1. Is the webbing in good condition?	<ul style="list-style-type: none"> Look for frayed areas: • Sits in tears • Abrasion damage especially where there is contact with hardware • Damaged stitching • Straps that are twisted with heat, compression, or stretch • Contamination from acids, alkalis, solvents, or other hazardous materials • Abrasion damage • Discoloration of the webbing • Cracks or splits in the webbing • Heat damage and loss of strength • Open ends • Heat treatment of the web over its full length • Broken, weak or misplaced latching components with one-way locks • Free from dirt or other obstruction, e.g. mud 			
2. Are the Snaps buckles and hardware in good condition?	<ul style="list-style-type: none"> • Buckles: verify movement and latching action of the Snap, where it is indicated in the manufacturer's instructions • Buckles: Examine vertical movement of the Snap in relation to the webbing and ensure it is secure in the Snap • In case of a Snap, check the Snap is in the correct position of the Snap • Cracks, especially at the intersection of the strap and metal hardware • Discoloration or other physical damage due to heat • Damaged ends of cross-section due to heat 			
3. Are the D-rings in good condition?	<ul style="list-style-type: none"> • Buckles: verify movement and latching action of the D-ring, where it is indicated in the manufacturer's instructions • Buckles: Examine vertical movement of the ring in relation to the webbing and ensure it is secure in the D-ring • In case of a D-ring, check the D-ring is in the correct position of the D-ring • Cracks, especially at the intersection of the strap and metal hardware • Discoloration or other physical damage due to heat • Damaged ends of cross-section due to heat 			
4. Are the Buckles and adjusters in good condition?	<ul style="list-style-type: none"> • Buckles: verify movement and latching action of the Buckle, where it is indicated in the manufacturer's instructions • Buckles: Examine vertical movement of the Buckle in relation to the webbing and ensure it is secure in the Buckle • In case of a Buckle, check the Buckle is in the correct position of the Buckle • Cracks, especially at the intersection of the strap and metal hardware • Discoloration or other physical damage due to heat • Damaged ends of cross-section due to heat 			
5. Is the Sewing in good condition?	<ul style="list-style-type: none"> • Broken, cut or worn threads • Straps or webbing that are damaged due to heat, abrasion, or other physical damage • Straps with heat, corrosion, solvents or other hazardous materials • Heat • Abrasion or tearing • Discoloration or other physical damage due to heat, abrasion, or other hazardous materials • Damaged ends of cross-section due to heat 			
6. Are the Straps in good condition?	<ul style="list-style-type: none"> • Broken, cut or worn threads • Straps or webbing that are damaged due to heat, abrasion, or other physical damage • Straps with heat, corrosion, solvents or other hazardous materials • Heat • Abrasion or tearing • Discoloration or other physical damage due to heat, abrasion, or other hazardous materials • Damaged ends of cross-section due to heat 			
Are the chains in good condition?	<ul style="list-style-type: none"> • Broken, cut or worn threads • Straps or webbing that are damaged due to heat, abrasion, or other physical damage • Straps with heat, corrosion, solvents or other hazardous materials • Heat • Abrasion or tearing • Discoloration or other physical damage due to heat, abrasion, or other hazardous materials • Damaged ends of cross-section due to heat 			



Part of your inspection must include putting the harness on and checking that it fits correctly and comfortably.

Always follow the manufacturer's instructions for fitting the harness.

3.2.2 INSPECTING INERTIA REELS

When inspecting inertia reels make sure you check the following:

Rope

- ▶ Make sure the rope can be fully extended and retracts back properly.
- ▶ Check the entire length of the rope for any damage (abrasion, fraying, stretching, evidence of contact with heat or chemicals).

Make sure you give the rope a firm pull while fully extended to test the rope is securely attached to the drum of the inertial reel.

Anchorage Body

The main 2 parts to check on the anchorage body are the mounting ring and the casing.

- ▶ Check that there is no visible damage to either of these components.
- ▶ Also check that there are no loose or missing parts.

Locking Mechanism and Rope Guides

- ▶ Check for any wear or damage.
- ▶ Check that the locking mechanism is working correctly and holds securely.
- ▶ Check that the rope rewinds completely without loss of tension.

Snap Hooks and Links

- ▶ Make sure the locking action is working on these parts and that there are no signs of damage or wear.



3.2.3 INSPECTING LADDERS

It is vital that you only use ladders that are in good working order.

Do not use a ladder with any of the following faults:

- ▶ Timber stiles are warped, splintered, cracked or bruised.
- ▶ Metal stiles are twisted, bent, kinked, crushed or with cracked welds or damaged feet.
- ▶ Rungs, steps, treads or top plates are missing, worn, damaged or loose.
- ▶ Tie rods are missing, broken or loose.
- ▶ Ropes, braces or brackets are missing, broken or worn.
- ▶ Timber members (apart from narrow identification bands) are covered with opaque paint or other treatment that could disguise faults in the timber.



3.3 INSTALLING SAFETY SYSTEMS AND EQUIPMENT

All safety systems and equipment must be installed and regularly checked by a competent person.

In some cases this is a person qualified with a scaffolding or rigging high risk licence.



3.3.1 INSTALLING A SAFETY NET



Safety nets must be securely anchored before any work starts. They must also be constructed of material strong enough to catch a falling person or object.

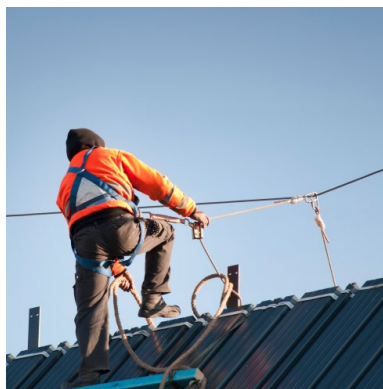
A safety net should be installed as close as possible to the underside of the work area (no more than 2m) and extend at least 2.5m beyond it.

Prior to the installation of a safety net, the intended configuration, method of attachment and strength of the supporting structure should be verified as adequate by a competent person such as an engineer experienced in structural design.

The verification should be in writing and retained on site until the net has been dismantled.



3.3.2 INSTALLING FALL-ARREST SYSTEMS

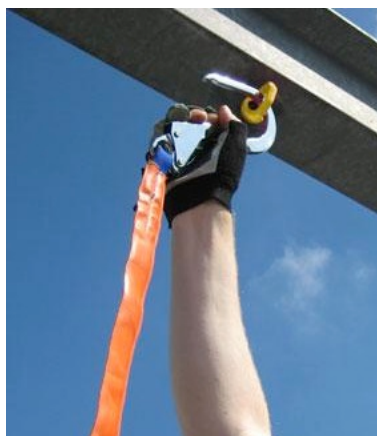


Fall-arrest systems require a high degree of planning, training and supervision and rely heavily on workers always 'doing the right thing' and not taking short cuts.

For these reasons, they should only be used where none of the other methods are practicable.

Each safety line system is designed and installed based on the number of people connected to the line at any one time, and also takes into account the use of regular or energy absorbing lanyards.

3.3.2.1 INSTALLING ANCHORAGES AND LINES



Each anchorage point should be located so that a lanyard of the system can be attached to it before the person using the system moves into a position where the person could fall.

Anchorage points used should be located as high as equipment permits, as it is safer to work below the point of anchorage. Where the anchorage point is below the harness connection point a shorter lanyard may be required.

Anchorage should be rated at:

- ▶ A minimum breaking strength of 15kN (1500kg) for 1 worker.
- ▶ A minimum breaking strength of 21kN (2100kg) for 2 workers.

Anchorage and lines between supports should be positioned on the inside face of columns where practicable and used to anchor static lines, or the static line may pass through a cavity tube cast in concrete for that purpose.

Static lines between supports must be free of obstructions to allow uninterrupted movement for persons who may be attached to the line. If a line passes around a column, corner, or other sharp edge, it should be packed to prevent damage to the line.



3.3.2.2 LIMITING FREE-FALL DISTANCE IN FALL-ARREST SYSTEMS



Fall-arrest systems incorporating a lanyard should be installed so that the maximum distance a person would free fall before the fall-arrest system takes effect is two metres.

There should be enough of a distance between the work surface and any surface below to enable the system, including the action of any shock absorber to fully deploy before a worker hits the ground.

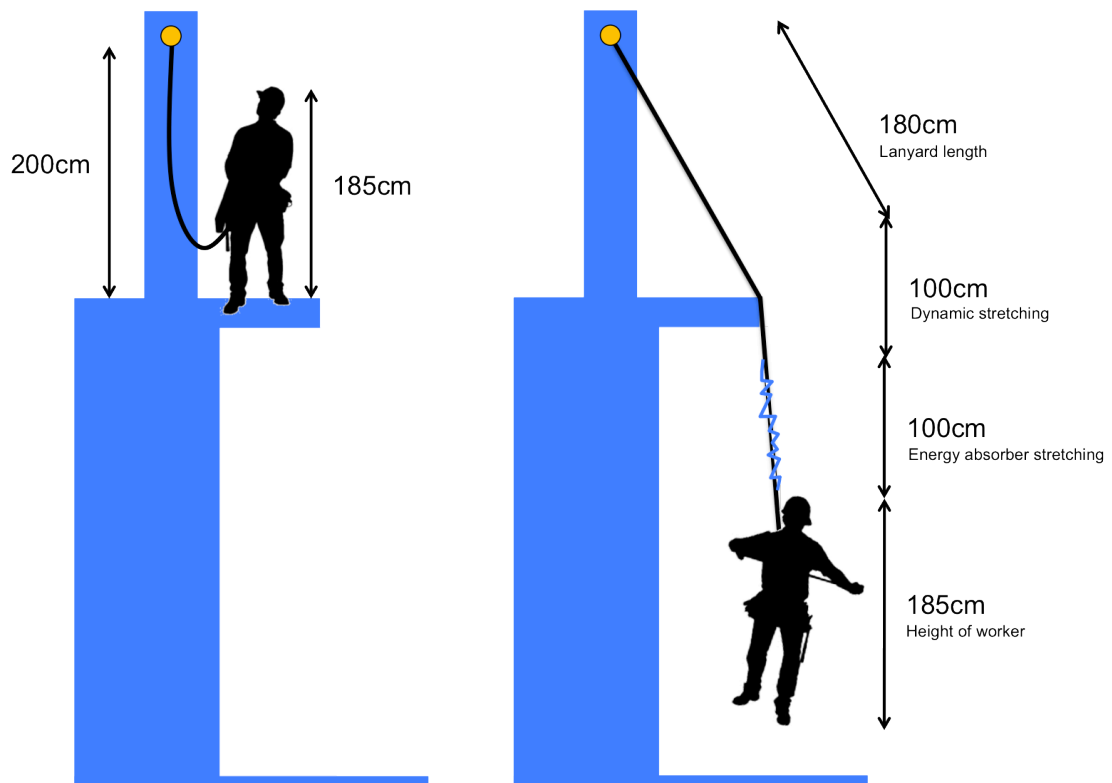
To work out whether there is enough distance available, you should take into account:

- ▶ The worker's height.
- ▶ The height and position of the anchorage point.
- ▶ The length of the lanyard.
- ▶ Any slack in the horizontal life line.
- ▶ Any stretching of the lanyard or horizontal life line when extended by a fall.
- ▶ The length of the energy absorber when extended by a fall.



For example:

- ▶ John is 185cm tall.
- ▶ The anchor point is above his head, a distance of 2m from the unprotected edge.
- ▶ The lanyard he is using is 1.8m long with an energy absorber that will extend up to 1m in the event of a fall.
- ▶ Allow 1m for stretching of the horizontal life line (if using one)



The total fall distance before this configuration would be effective is 5.65m

3.3.2.3 MONITORING OF FALL-ARREST SYSTEMS



It is important that all safety equipment is monitored and checked regularly to ensure it is still an effective control measure for preventing injuries caused by falls.

Each component of the fall-arrest system, including its attachment to an anchorage, must be inspected by a competent person:

- ▶ After it is installed but before it is used.
- ▶ At regular intervals in accordance with workplace procedures.
- ▶ Immediately after it has been used to arrest a fall.

Inspection of the system and its components should be conducted in accordance with the manufacturer's specifications and the relevant standards (e.g. AS/NZS 1891).

If any faults, signs of wear or weakness are found during the inspection, the system should be removed from use until corrective action can be taken, such as replacing defective or worn components.

Never use a fall-arrest system that is faulty in any way!



4.1 SAFELY ACCESS WORK AREA

Once you have selected and inspected the tools and equipment for your work, and checked that the appropriate safety system has been safely installed and fitted you will need to access the work area and install the equipment to perform your work at heights.

You need to check the access from the ground to your work area to make sure it is safe, free of obstructions and meets all safety and work requirements.

Do not remove scaffold components when accessing a work area.



4.1.1 USING PORTABLE LADDERS TO GAIN ACCESS

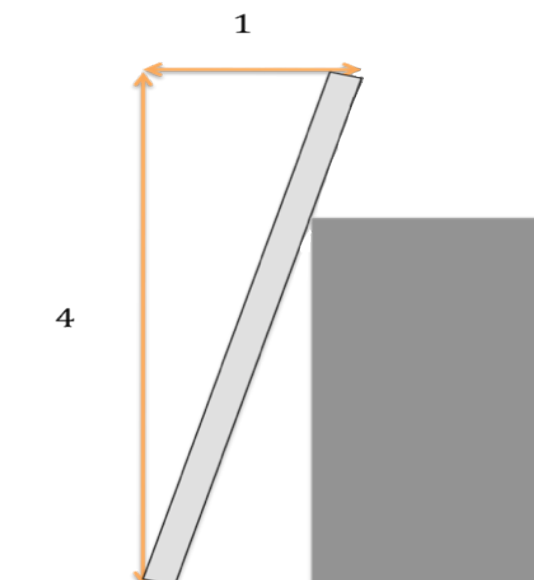


Ladders should be installed so that:

- ▶ They are on stable ground and secured against movement both at the top and base.
- ▶ Step ladders are fully opened with spreaders locked into position.
- ▶ Only approved attachments are used.
- ▶ Extend at least one metre above the access level.
- ▶ Metal ladders are not to be used where there are electrical hazards.

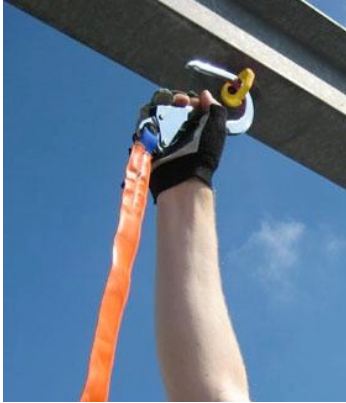
- ▶ Single and extension ladders are placed at a slope ratio of 4 vertical to 1 horizontal (4:1).
- ▶ They are not used on working platforms or scaffolds to gain extra height.

Only light duty work should undertaken while on a ladder, where three points of contact can be maintained and tools can be operated safely with one hand.



Depending on the type of work you may be required to use a fall prevention system that is connected to a ladder.

4.1.2 CONNECTING TO THE FALL-ARREST SYSTEM



Anchor points and static lines should be installed to allow workers to safely connect before coming too close to an unprotected edge.

Make sure all safety catches are properly connected to anchor points and that only the allowable number of people is attached to the fall-arrest system

4.2 CONDUCT WORK AT HEIGHTS SAFELY



It is essential that all work done at heights is conducted safely at all times, in accordance with OHS/WHS requirements and the safe working practices of your worksite.

Dangerous situations can arise very quickly, sometimes with tragic consequences.

When working at heights:

- ▶ Make sure that the work area is kept clean and tidy. Rubbish should be removed regularly in a safe manner. Do not throw rubbish down from the work area to the ground.
- ▶ Keep access ways clear of materials, tools and equipment.



Be careful of hazards such as clothing catching on objects and structures. Also take care when working on fragile roofing.

Always use walkways or planks when moving around and stay in designated work areas.



4.2.1 CHECKING WEATHER CONDITIONS

It is important that you remain aware of changing weather conditions so that you can adjust your operating methods and techniques where appropriate, or stop work altogether if necessary.

Sudden strong gusts of wind may cause workers to lose their balance or cause materials or equipment to be swept over the edge of the work area.

Rain may cause the surface of the work area to become slippery.



4.2.2 HANDLING AND SECURING EQUIPMENT AND MATERIALS



When you are moving or using materials and equipment always make sure you follow the requirements for manual handling to prevent injuries to yourself and others.

You should avoid excessive bending or twisting.

Attempting to move heavy or awkwardly shaped loads may lead to losing your balance, resulting in a fall.

Whenever possible use other means of moving tools and equipment up to and around the work area.

For example:

- ▶ Team lifts.
- ▶ Conveyors.
- ▶ Elevating work platforms.

Be particularly careful when carrying materials on ladders.

Only one person should be on a ladder at a time.

While on a ladder you should have three points of contact, i.e. two feet and one hand or one foot and two hands, on the ladder at all times.





Make sure when you are moving tools and equipment to or around your work area that potential hazards, such as dropping them over edges, are minimised.

This could be done by:

- ▶ Securing tools and equipment to a belt.
- ▶ Hoisting materials and equipment up separately.
- ▶ Making sure that catch platforms and safety nets are in place before moving tools, equipment and materials to the work area.

Tools, equipment and materials should be placed or installed in the work area in a way that will eliminate or minimise the risk of them being knocked down.

For example:

- ▶ Keep tools and materials away from unprotected edges.
- ▶ Make use of lanyards while using hand tools.
- ▶ Store unused tools and equipment in a toolbox or container.



4.3 MONITOR SAFETY EQUIPMENT AND RISK TREATMENTS

While working at heights you should regularly monitor equipment, safety systems and the work area for changing conditions or new potential hazards.



4.3.1 MONITORING EQUIPMENT AND SAFETY SYSTEMS

You need to check that all equipment and components of safety systems remain safe, effective and undamaged during work so that they comply with requirements and procedures.

This means ensuring that fall protection equipment is kept in place and adjusted appropriately to cater for any movement during work.

You should also check that edge protection and fall barriers, e.g. safety nets, are kept in place during work.



4.3.2 MONITORING AND ADJUSTING RISK TREATMENTS



Monitoring the existing risk control treatments that are in place means checking to ensure they are effective and appropriate to the task and the work environment.

These risk control measures may need to be reassessed and adjusted if work practices and/or site conditions change and new hazards are identified.

4.4 EMERGENCY PROCEDURES

Emergencies can happen quickly and without warning when work is being done at heights. If all necessary precautions, hazard control measures and safety equipment have been used then the risk of serious consequences is reduced.

However you should always be prepared to take action in an emergency situation, even if that action is as simple as calling for help.



4.4.1 SUSPENSION INTOLERANCE

Suspension intolerance can occur with a fall-arrest system when a person has an arrested fall and is suspended in an upright, vertical position with the harness straps causing pressure on the leg veins.

The lower legs' capacity to store large amounts of blood reduces the return of blood to the heart, slowing the heart rate, which can cause the person to faint.

This may lead to renal failure and eventually death, depending on a person's susceptibility. This condition may be worsened by heat and dehydration.



SIGNS AND SYMPTOMS OF SUSPENSION INTOLERANCE INCLUDE:

- ▶ Faintness.
- ▶ Breathlessness.
- ▶ Sweating.
- ▶ Paleness.
- ▶ Nausea.
- ▶ Dizziness.
- ▶ Low blood pressure.
- ▶ Unconsciousness.

4.4.1.1 PREVENTING SUSPENSION INTOLERANCE



The following techniques can be used to help prevent suspension intolerance in a person who is hanging in a fall arrest harness:

- ▶ Never work alone when using a harness as fall protection.
- ▶ Wherever possible use a fall arrest harness that allows legs to be kept horizontal
- ▶ If possible keep the time a worker spends in suspension after a fall limited to less than five minutes. This can be achieved by providing foothold straps or a way of placing weight on the legs should be provided.

If you find yourself in a situation where you are suspended in a fall arrest harness after a fall attempt the following action:

1. Move your legs in the harness and push against any footholds to relieve pressure on your upper legs.
2. Move your legs as high as possible and tilt back so that you become as horizontal as possible.



The quick rescue of a person suspended in a full body harness, as soon as is possible, is vital. For this reason, workers should be capable of conducting a rescue of a fallen worker and be familiar with onsite rescue equipment and procedures.

If a worker has fallen and is hanging suspended in a safety harness for a prolonged period of time (5 to 30 minutes) it is absolutely vital that first aid procedures are implemented as quickly as possible.



4.4.1.2 FIRST AID FOR SUSPENSION INTOLERANCE



In accordance with Australian Resuscitation Council (ARC) guideline 9.1.5, first aid management of suspension intolerance should be carried out as follows:

1. Call for an ambulance (dial 000).
2. If unconscious, manage the victim according to basic life support principles. If conscious, rest the victim in a comfortable position, ideally lying down, and provide reassurance.
3. Loosen or remove the harness.
4. Administer oxygen if available.
5. Look for and manage associated injuries in the victim, especially if they have fallen or been electrocuted.
6. Monitor the signs of life at frequent intervals.

Remember, care of the airway takes precedence over any injury.



4.4.2 REPORT ALL HAZARDS, INCIDENTS AND INJURIES

Refer to Trade basics training

4.5 FINALISE OPERATIONS

Refer to Trade basics training

4.5.1 DISMANTLING SAFETY SYSTEMS



Safety systems such as static lines, falls arrest harness and safety nets should be dismantled according to the correct sequence and procedures.

They should then be removed from the work area.

If they are no longer necessary, risk/hazard control measures such as barriers and signs should be removed, cleaned and stored away.

Make sure this equipment is dismantled according to manufacturers' specifications.

Continue to work safely at heights while equipment is dismantled. Work methodically and follow site procedures, using safety equipment at all times.

During the disassembly process you need to maintain the stability of all structures and plant.

Unplanned collapse can result in serious injuries to personnel and damage to equipment and materials.



4.6 CLEAR WORK AREA AND STORE TOOLS AND EQUIPMENT

4.6.1 CLEARING THE WORK AREA

Refer to Trade basics training