

Working at Height Safety Guide

Best Practice Guidelines for Working at
Height – for Residential, Commercial &
Civil Construction, and all associated trades



Published by Site Safe New Zealand
22 The Terrace
Wellington
New Zealand

First Edition: June 2000

ISBN 0-473-06905-9

Contents

About This Guide	4
The Job Ahead – PLANNING	6
Basic Safety when Working at Height – SOLUTIONS	12
Safe Ladder Use – SOLUTIONS	13
Scaffolding – SOLUTIONS	17
Mechanical Plant for Supporting Personnel – SOLUTIONS	23
Working on Roofs – SOLUTIONS	27
Fall Protection Systems / Safety Harnesses – SOLUTIONS	31
Other Areas to Consider – SOLUTIONS	33
Further Information	35
A Word About Site Safe / Acknowledgments	36
Key Terms and What They Mean	37
Other Site Safe Guides Available	39
Appendix – References	41
Become A Site Safe Member	42

About this Guide

Falls from height are one of the main causes of injuries and deaths in residential, commercial and civil construction. When you risk a fall of 3 metres or more, regulations require that suitable fall prevention is available and used.

But don't let this fool you. You can be seriously injured or even die from falling only half a metre, so where a fall from any height could result in harm, an effective means of fall prevention needs to be considered and put in place.

This guide is intended as a useful tool for all those working at height in the construction industry – providing everyone involved with useful, practical information and solutions so they can create and maintain a safe working environment when working at height.

The guide summarises some key aspects specifically for the construction industry and associated trades when working at height. As 'Best Practice', the intent of the guide is to go beyond simply compliance and what is required in the Health and Safety in Employment Act (1992) and Regulations (1995) – encouraging the highest possible level of health and safety when working at height.

What's in the Guide?

The guide has been developed in consultation with representatives from throughout the construction industry, including OSH policy and operational staff, contractors and subcontractors, and other specialist construction trades. It has been written specifically for the construction industry, but may also have many other applications.

We are confident that the Site Safe best practice guidelines and other Site Safe products and services can help create a New Zealand-wide construction industry safety culture.

The guide includes:

- information for planning ahead when working at height
- an overview of the requirements of the HSE Act (1992) relating to working at height
- a breakdown of some of the key everyday situations and solutions for the construction industry when working at height



- useful examples and diagrams of ‘rights and wrongs’
- a list of key terms and what they mean
- a list of key organisations and further information available.

Note: Throughout this guide, terms in italics are defined in the section *Key Terms and What They Mean* (see page 37).

For more information, or for any area not covered in this guide, refer to the organisations or specific publications in the Appendix at the end of this guide.

The Job Ahead – PLANNING

There are hazards when working in every industry. When injuries and accidents occur, the costs are high – in people, profits and productivity.

One of the best ways to avoid injuries and minimise costs is through good planning, communication and coordination – both before and on the job. This should start when the decision is made to go ahead on the project, and should consider all stages and the parties involved, from the designer/adviser and client to the contractors and their employees.

Anyone who contracts another party for any part of a project (that is, engages anyone to work on a project for gain or reward other than an employee) has a duty as a principal (refer to Site Safe's *Construction Safety Management Guide*, see page 39 of this guide). Principals are required to take all practicable steps to ensure the health and safety of people contracted by them to carry out work of any kind throughout all stages of a project – and this includes any work at height. Several parties can be principals at any one time, and you may be wearing more than one 'hat' (you may be a principal but also an employer, for example) at any particular stage of a project.

Employer Responsibility

If you are an employer, under the HSE Act (1992) you must have an effective method for identifying and managing hazards. You also must involve your employees in this process and ensure they are trained in the work. Significant hazards (those where serious harm can occur) must be managed. Height hazards (where falls are often fatal) will more than likely be significant ones.

One hazard identification (hazard ID) method to use with your employees is Task Analysis. Look ahead to the tasks involved for each job – and at the same time identify the height hazards (or any other hazards involved) and develop the means to manage them. (Take a look at the flow chart on page 9 to help you with this process).

Remember to document your process – the easiest way is to simply write it down. All employers (including subcontractors) must have an effective means of managing hazards. Documenting hazards and the means of controlling them is a way of doing this. If you're self-employed, you must take all practicable steps to ensure that nothing you do, or don't do, while at work harms yourself or any others.



You are also required to have emergency procedures in place should anything go wrong on site. Plan ahead for anything that might happen – and be ready.

Situations to Think About

Planning is vital before you begin working at height. Anywhere you are at risk from a fall (no matter what height you're working at) a height hazard identification should be carried out. There are many common situations where this will be necessary.

Some areas where you risk a fall include any work:

- above ground level (be it construction, demolition, maintenance or cleaning), including any work over other hazards (such as work being carried out above protruding reinforcing etc.)
- near unprotected open edges of floors and roofs
- near unprotected penetrations or openings in roofs, floors or walls
- near unguarded shafts or excavations
- from unstable structures (temporary or permanent)
- on or near fragile or brittle surfaces (such as fibre cement, plastic or fibreglass sheet roofs or skylights).

Also consider:

- access to and from the work area
- the ability of work platforms to support the required people, tools and other equipment, with particular attention to the work to be carried out
- any changes to the level, friction, slope and conditions on work platforms
- obstructions caused by materials, rubbish or fixed and protruding objects
- the position of any unprotected work platform edges or penetrations
- the proximity of any overhead energy sources such as electricity
- the effect of wind, rain, the sun and the cold.

It is important that employers and employees work together to identify any hazards from working at height, and select the method of fall prevention that is most compatible with the type of work being done.

Remember: Don't work at height unless it is absolutely essential. Where you must, you should avoid working alone, and choose the most appropriate procedures and fall prevention method that provides the best and safest means of doing the work.

For the best method, **ask yourself:**

- in what situation is the fall prevention required?
- what is the nature, size and layout of the workplace (ie: will the work surface support the intended load; is the work surface wide enough; are there any obstructions in work areas from tools, materials or rubbish; are there uneven work surfaces; are there wet, oily or otherwise slippery work surfaces)?
- what is the extent and type of work to be carried out (for example: is it installing a whole new roof or simply replacing a few tiles on an existing roof)?
- will workers need to move from one surface to another when working at height?
- are there several different contractors working on site simultaneously, above and below each other?
- what are the work conditions like? (might workers be working in rain or wind, or poor lighting that may conceal unguarded edges etc?)
- what are the pros and cons of each type of fall prevention?
- what degree of training and supervision is needed to ensure the correct use?
- how can the system be safely installed?
- what maintenance schedules or skills are needed to ensure satisfactory performance?
- how will the correct work procedures be implemented?



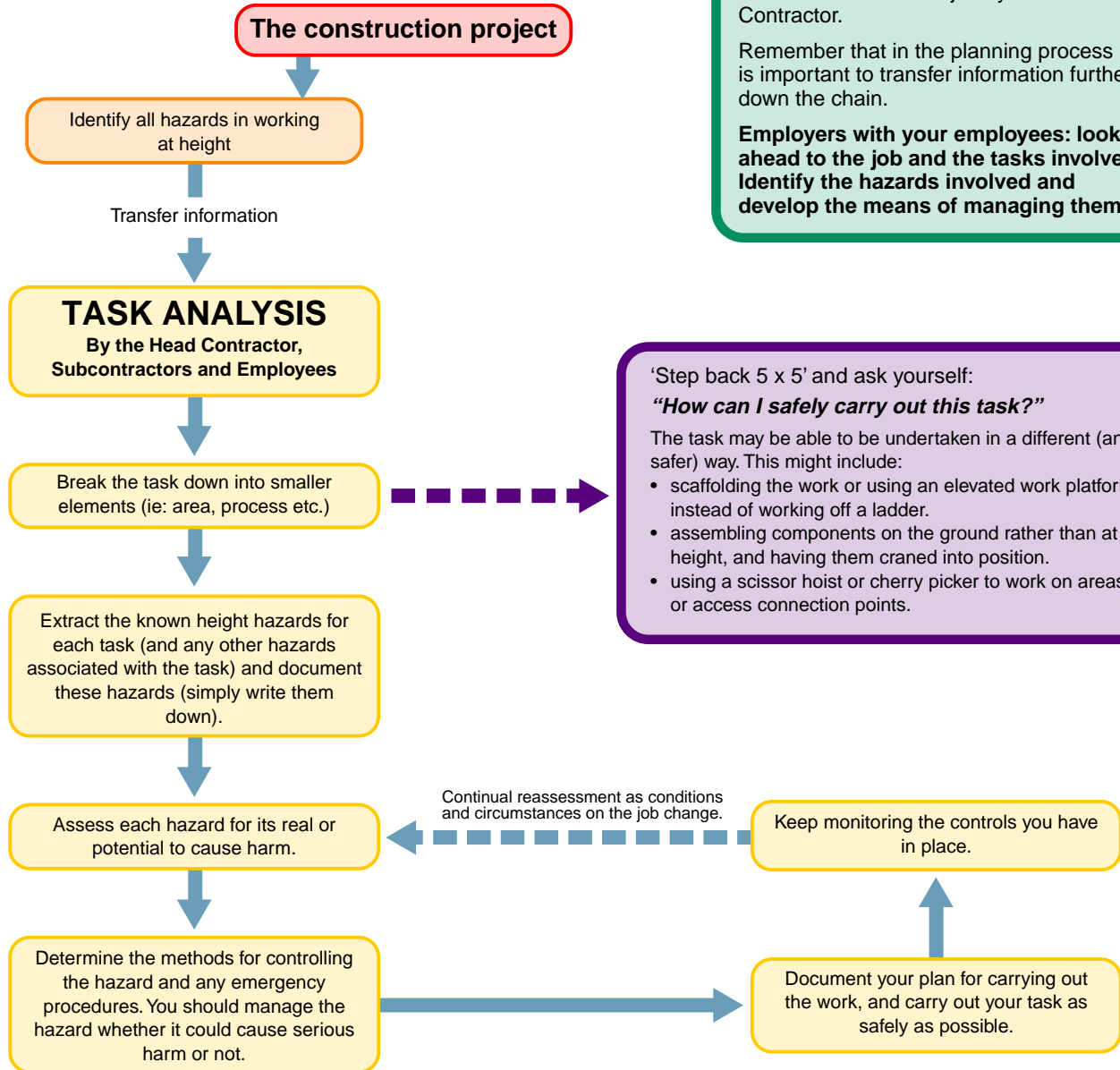
(Image courtesy National Safety Council of Australia – NSCA)

There's always a better way of carrying out a task...

continued...

Task Analysis when working at height – from the Head Contractor to the worker on the tools

Use the flow chart below to help work through the planning and task analysis processes required on a construction project. It can be adapted for all areas in construction – not just when working at height – as the same planning processes are required irrespective of the task.



Project Head Contractor selected with health and safety factored into the tendering and selection process. (See Site Safe's *Health & Safety Guide for the Tendering Process*.)

Selection of trained experienced subcontractors for the job by the Head Contractor.

Remember that in the planning process it is important to transfer information further down the chain.

Employers with your employees: look ahead to the job and the tasks involved. Identify the hazards involved and develop the means of managing them.

'Step back 5 x 5' and ask yourself:
"How can I safely carry out this task?"

The task may be able to be undertaken in a different (and safer) way. This might include:

- scaffolding the work or using an elevated work platform instead of working off a ladder.
- assembling components on the ground rather than at height, and having them craned into position.
- using a scissor hoist or cherry picker to work on areas or access connection points.

Continual reassessment as conditions and circumstances on the job change.

Keep monitoring the controls you have in place.

Document your plan for carrying out the work, and carry out your task as safely as possible.

Determine the methods for controlling the hazard and any emergency procedures. You should manage the hazard whether it could cause serious harm or not.

Assess each hazard for its real or potential to cause harm.

Extract the known height hazards for each task (and any other hazards associated with the task) and document these hazards (simply write them down).

Break the task down into smaller elements (ie: area, process etc.)

TASK ANALYSIS
By the Head Contractor,
Subcontractors and Employees

Identify all hazards in working at height

The construction project

Employee Responsibility

As an employee, you are required to take all practicable steps to ensure your own and others' safety through your actions. You must also not knowingly expose yourself or others to harm. For example, employers should require their employees to report hazards and use safety equipment provided.

One very simple form of hazard ID you can use while on the job is the 'Step Back 5 x 5' method. Simply step back five paces and spend five minutes planning and thinking about the task at hand.

Ask yourself:

- what is needed to complete the work safely?
- are there any other people on site who may be affected by my activity?

Some of the risk areas listed previously will help you to think about the possible risks and hazards involved in a task.

Where you (either the employer or employee) identify that there is a risk or hazard from working at height (or any other area), **ask yourself:**

- what is the likelihood that an unsafe situation or event will occur?

and

- what is the severity of harm that could result?

If it is significant (probably 'yes' if you are working at height), then you have to **manage** the hazard by ideally eliminating it. If this is not possible, either isolate or minimise it.



Isolating a fall hazard by barricading off a floor penetration.

Managing the Hazard

Eliminating the hazard **must always be the first option.**

Ask yourself:

- how can I remove the hazard altogether?

You might decide that you could assemble the component on the ground (or carry out as much of the work as possible at ground level), eliminating the need to work at height. You could also decide to scaffold the work instead of working off a ladder, or to use a cherry picker. There will always be a number of options – just 'step back 5 x 5'.

Isolation. If there is no way that you can eliminate a height hazard (or any other hazard for that matter), then you should try to isolate it.

Ask yourself:

- how can I separate the hazard from myself and any other worker?

This could include preventing access to an area where a fall might occur by physically locking off a floor or area of a building to prevent access.

It may also include making sure guardrails are in place on an unprotected edge, preventing anyone from falling over it, or making sure any floor penetrations are covered or barricaded off.

Minimisation. Only when the first two methods of managing a height hazard are impracticable should you minimise it.

Ask yourself:

- what can I do to minimise the possible consequences should an incident occur?

This might involve wearing personal protective equipment (a safety harness for example) so that in the event of an incident your fall will be arrested.

Remember though – minimising the hazard by wearing a safety harness *should always be your last resort.*

Remember: unless you have eliminated the hazard it can still exist. So you need to continue to monitor the hazard in case there are any changes to the situation or work method. And don't forget to have your emergency procedures in place.

Solutions to help you plan further for safe working at height are included in the following sections.

Basic Safety when Working at Height – SOLUTIONS

General Introduction

Have you:

- created a controlled work environment when working at height?
This should include:
 - ensuring safe access and egress
 - installing guardrails around perimeters and penetrations
 - setting up fall protection barriers (such as safety mesh or edge protection)
 - considering the risks involved from overhead services such as power lines
 - considering the risks involved from objects falling from height
 - implementing a suitable means to prevent a fall.
- made sure any walking or working surfaces are strong enough to support employees safely and that any unprotected edges have fall protection in place?
- made sure emergency procedures are in place should an accident occur or anything go wrong on site?
- made sure any necessary isolation procedures are in place (such as barricading and signage below the area of work to prevent workers or passers by from being harmed from tools or material which may be dislodged from above)?
- provided anchorage points compatible with any fall arrest system (such as a safety harness) being used?



(Photo courtesy Guardrail Systems Ltd.)

One of many roof edge guardrail systems available.

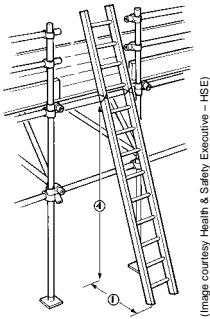


Remember: You can be seriously injured or killed from falling just a short distance. So where a fall from any height could result in harm, an effective means of fall prevention needs to be put in place.

Safe Ladder Use – SOLUTIONS

Ladders

Before use, you should always consider whether using a ladder is the best and safest means of doing the job. You might decide it would be safer to work from a cherry picker or scissor hoist, or that scaffolding the work would be safer and also help with further work to be carried out.



For a safe ladder angle, use the guide 'four up, one out'.

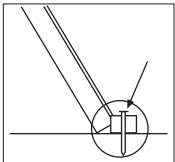
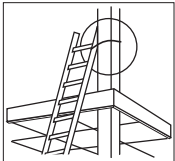
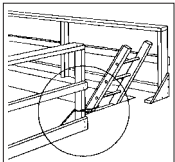
(Image courtesy Health & Safety Executive – HSE)

Remember: ladders are not designed as working platforms. They should only be used for access or to carry out minor or routine work. Only one person should use a ladder at any one time.

If the only means of doing the task is using a ladder:

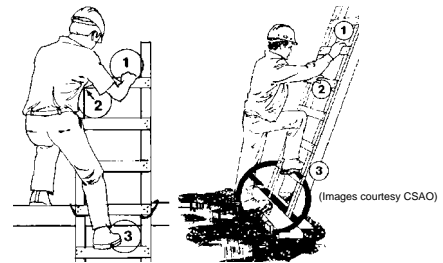
Take the following precautions:

- check you're using the ladder at a safe angle – use the guide 'four up, one out'
- allow at least a 1 metre extension above the step-off point (unless some other form of hand hold is provided)
- set the ladder up on a firm even surface (unless a secure method is used to ensure an even distribution of weight between the stiles)
- secure the ladder at the top and bottom **as soon as it is placed** (sandbag or block the base of the ladder or use a suitable tie or cleat to prevent it slipping, and remember to get someone to hold the ladder until another can secure the top)
- keep three points of contact at all times when using a ladder
- consider the need to place cones or barricading where the ladder encroaches onto a passage or roadway.

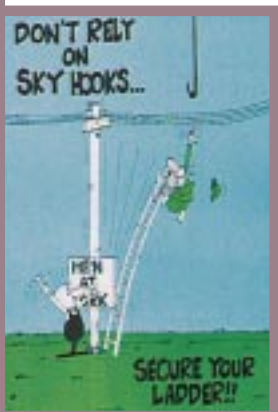


(Images courtesy Construction Safety Association of Ontario – CSAO)

Securing the ladder as soon as it is placed is vital.



Keep three points of contact with the ladder at all times.



(Image courtesy NSCA)

Always ask yourself:

- is the ladder in good condition and suitable for the type and the height of the work to be carried out?
(note that ladders, stepladders, and trestles should be designed to a recognised standard)

Regular and careful inspections are needed to ensure any damage or excess wear is found and repaired quickly. So before use, check for:

- bent or twisted stiles
- loose, bent, worn or split rungs or steps
- loose, bent or disconnected braces between steps and stiles or backframe
- damaged or missing locking bars
- missing rivets or worn or missing non-slip feet.

Never use a ladder that you suspect has structural damage.

And never:

- use a ladder horizontally as a work platform
- carry a load that will prevent both hands from being able to hold or grab the rungs
- over-reach on a ladder (your belt buckle should remain within the stiles of the ladder at all times)
- hang any tools or other items from the steps or rungs of a ladder (unless specifically designed for this purpose).



Never over-reach on a ladder

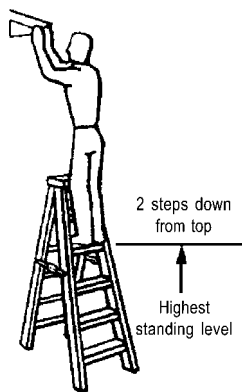


Step Ladders

Step ladders are not designed to be used as supports for a working platform. They are inherently unstable. Where they are not being used for their intended purpose (for access or to carry out minor works or routine maintenance), other safe work methods such as scaffolding or elevated work platforms must be used. Again, you should always consider whether using a step ladder is the best and safest means of doing the job.

Also remember:

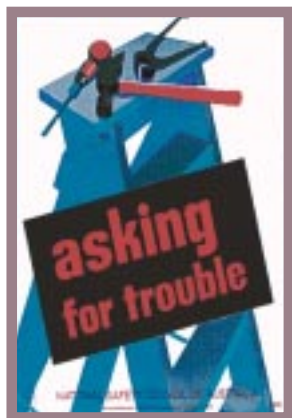
- never work any higher than two steps down from the top of the ladder **and**
- when using a step ladder as a single ladder, the locking clips must be in place to prevent inadvertent bending at the hinge joint.



Never work higher than two steps down from the top of a step ladder.



(Image courtesy CSAO)



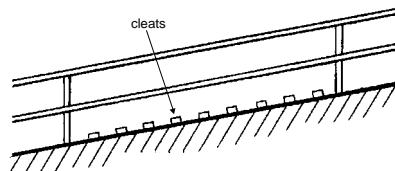
(Image courtesy NSCA)

Flat Roof Walkways and Roof Ladders

Flat roof walkways and roof ladders are both excellent means of walking or working safely on roofs – particularly where brittle or fragile roofing material is present. (see page 30)

Flat roof walkways (generally for roofs pitched less than 10 degrees) can be permanent or temporary and are often used to provide access to a work position, to service plant, or for access on pitched or brittle/fragile roofs.

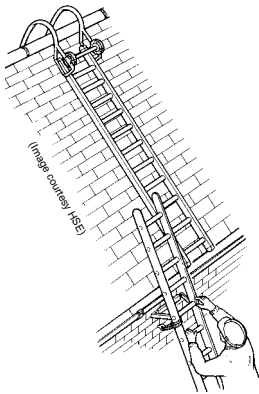
Flat roof walkways need to be at least 450mm wide and include a handrail. They should also have a non-slip surface or cleats – depending on the pitch of the roof. On brittle or fragile roofing, guardrails should be permanently installed.



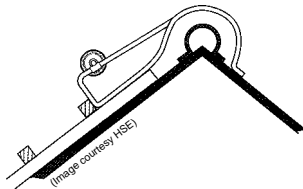
A flat roof walkway with cleats and handrail.

Roof ladders should generally be used on roof pitches of 10 degrees or more. The bracket on the top of the roof ladder needs to be deep enough to reach over the ridge of the roof (see diagrams).

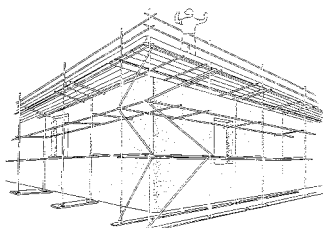
Remember to always consider the most appropriate method and fall prevention equipment that provides the best and safest means of doing the work. In some situations (such as the low end of a walkway, or where you are close to an edge) you may still need another means of fall prevention (perimeter edge guardrailing or a safety harness, for example).



Roof ladders can allow a safe means of working on a roof – particularly where brittle or fragile material is present. Remember any access ladders need to be secured.



Scaffolding – SOLUTIONS



(Image courtesy Victorian WorkCover Authority)

Scaffolding the perimeter of a building can provide an excellent working platform at any height.

Scaffolding is used widely on both residential and commercial sites and provides a good working platform at any height. Constructing a scaffold is a complex task. It needs to be designed and erected to suit the type of work to be carried out, the site conditions, and the anticipated work load (ie, the number of workers expected to be working on the scaffold, their materials and tools etc.)

As there are a wide variety of systems available, you need to carefully select the type to suit the intended purpose. Often safeguards to prevent workers falling from scaffolding and working platforms are inadequate or not used at all.

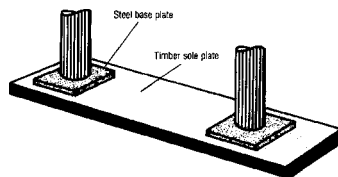
Before You Work on any Scaffold:

Ask yourself, have you:

- made sure all scaffolding is suitable and safe to use?

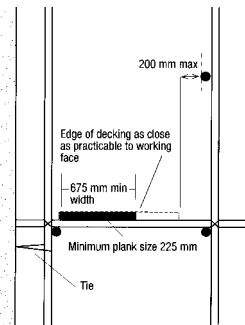
For example:

- is the scaffold built to suit the work at hand?
- is it erected on a firm foundation/have you considered the need for sole plates?
- are all guardrails, midrails and toeboards in position and at the correct height?
- are there enough planks to form the work platform and are they secured in position?
- are the platforms at the correct levels?
- how far is it from the closest plank to the workface, and also to the outer edge of the scaffold?



Sole plates for tubular scaffold standards.





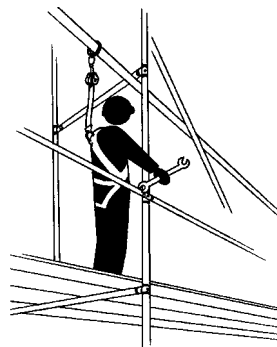
Planks need to be as close as practicable to the face of the working structure.

- is there an inside guardrail fitted if the scaffold is 200mm or more away from the work surface/structure?
 - what access is provided to and between platforms?
 - is a full safety harness needed?
 - are all scaffold ties in place?
 - will the scaffold carry the necessary loads, including workmen and any tools and materials? (make sure you provide all the details about how it is going to be used when you're having the scaffold built).
- ensured that a certificated scaffolder is in direct charge of erection, alterations or dismantling of any scaffold 5 metres or more in height (and a register kept for general inspection)?

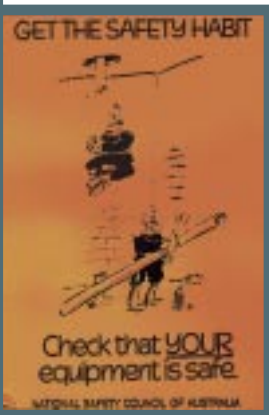
Note: Any person who is using a scaffold 5 metres or more in height should check that the scaffold register (or similar Scaf-tag or Acu-log systems) is completed, current and up to date.

Remember: scaffolding should always be checked before it's used. **Any** person who is going to work on a scaffold should check to see that nothing has been altered or removed **before** they start working. Use the list above and always check to ensure that no one else using the scaffold has removed any planks, guardrails etc.

Don't forget that you should also be wearing fall protection equipment (a safety harness and lanyard as in the example below) when **erecting** any scaffold over 3 metres, or where a fall from any height could result in harm.



(Image courtesy WorkSafe Western Australia)



(Image courtesy NSCA)

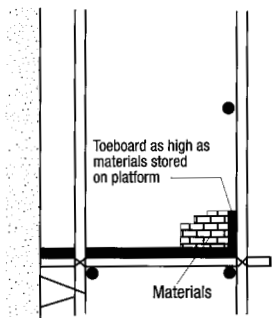
Guardrails and Toeboards

These are used to prevent falls in a number of areas – including when you are working on scaffolding.

Remember that handrails are only to assist balance; guardrails are to prevent falls.

Ask yourself, have you:

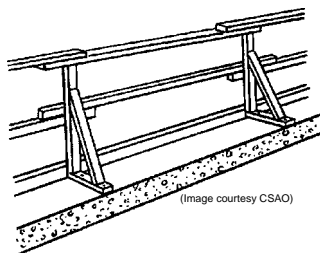
- made sure the top rail is between 0.9 and 1.1 metres above the floor or platform level, or front of the stair nosing?
- ensured a mid rail has been fitted for guardrails?
- fitted a toeboard of sufficient height (these must be 225mm high minimum, or higher if stacking materials etc.) anywhere there is a danger of tools or materials being lost over the edge?
- made sure the timber is of sound quality and free from any knots and cracks where you are using timber railings?



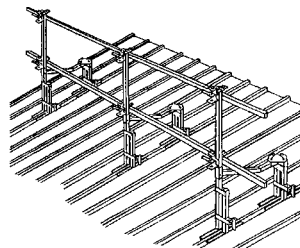
Toeboards help prevent objects being lost over the edge and hitting those who might be working below.



(Image courtesy NSCA)



(Image courtesy CSAG)



(Image courtesy Guardrail Systems Ltd.)

Several different types of guardrail systems, including (from left) a wooden guardrail, a proprietary guardrail system, and a roof edge guardrail – all with midrails fitted.

Standing Scaffolds & Scaffold Brackets

The precautions that apply to standard scaffolding also apply to standing scaffolds and the many variations of scaffold brackets, though there are specific issues.

Ask yourself, have you:

- made sure the scaffolder or a *competent person* (a *Registered Engineer* for example) inspects the scaffold each week it is in use; or after any occurrence that could affect its stability?

The person inspecting the scaffold needs to make sure that:

- all guardrails are correctly fitted and working platforms and planks are secured against movement on areas in use
- safe access is provided to all working platforms
- sufficient scaffold ties and braces are in place
- all load bearing members are in the correct place and properly secured with the correct fittings
- working platforms are full width, properly secured and in good condition
- no guardrails and planks have been temporarily removed.

Also, have you:

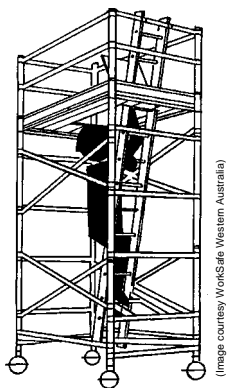
- made sure the scaffolder has completed a scaffold register for any scaffold or working platform 5 metres or more above the ground, and made sure it has been seen and understood before the scaffold is used?

And remember: all users should inspect the scaffold area they are going to work in before starting work to make sure there is no risk of a fall. If you find any instability or structural damage **don't** use it until you've had it inspected by a *competent person* or a certificated scaffolder.



(Photo courtesy HSE)

Tower scaffolds can provide a good means of access – but make sure they are properly secured.



An example of a mobile scaffold – raker bracing should be installed to provide extra stability.

Mobile Scaffolding

Mobile scaffolds are mounted on wheels to allow easy movement on firm and level surfaces. When using mobile scaffolds however, there are several extra points you should always remember.

Before You Work on a Mobile Scaffolding:

Always ensure:

- the mobile scaffold is set up on firm level ground
- all wheels on the scaffold are locked
- the wheels are turned out (this increases the stability of the scaffold)
- the decking on the scaffold is fully planked out and secure
- access is from a ladder within the frames of the scaffold (remember to secure the ladder at the top and bottom) – never climb up the outside
- you don't exceed the height restriction (the scaffold should be no higher than 3x the width of the base and 1.5x the length of the base at the narrowest point)
- raker bracing is installed to provide stability (2 outriggers per corner braced both ways)
- you have checked for overhead powerlines
- another means of fall prevention (such as a safety harness) is used where guardrails can't be fitted.

And remember: only use mobile scaffolds on firm level ground, and **never** 'ride' a mobile scaffold.



(Image courtesy NSCA)

Trestles and Tripods

Common on residential projects, trestles and tripods are self-supporting metal or timber stands with horizontal members to support one end of a 'light duty working platform'.

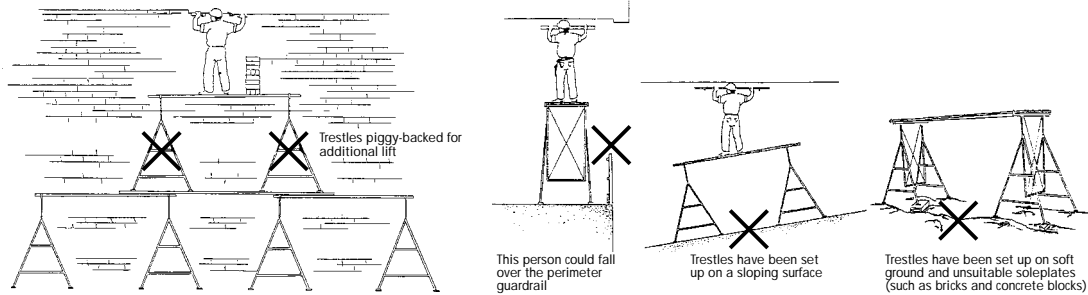
When Working with Trestles or Tripods:

Ask yourself:

- is the equipment well maintained?
- is fall prevention (such as guardrails etc.) provided if the platform is

3 metres or more in height or where there is the possibility of harm from a fall from any height?

- are the legs of the trestle set up on firm level ground?
- have adequate sole plates been used on soft ground?
- are the planks centralised on the trestles?
- are the trestles designed to support the total load?
- are the positive locking bar hinges in place to hold it rigid?



The wrong way to use trestle scaffolds.

(Images courtesy Victorian WorkCover Authority)

Suspended Scaffolds and Boatswain's Chairs / Special Scaffolds

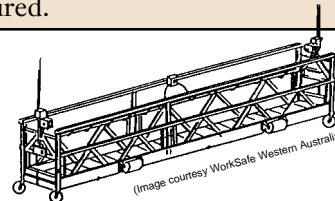
These are **extremely specialised** areas – fixing points and structural stability need to be carefully assessed, and any erection, alteration or dismantling must be carried out by a certificated scaffolder. Only use these systems if you have been specifically trained in their use.

Remember: whenever using a suspended scaffold, make sure you wear a safety harness and ensure it is secured.



(Image courtesy HSE)

Only use a boatswain's chair if you have been specifically trained in its use.



(Image courtesy WorkSafe Western Australia)

Safety harnesses must be worn at all times when working from a suspended scaffold.

Mechanical Plant for Supporting Personnel – SOLUTIONS

There are a wide range of different machines designed for supporting personnel. These include vehicle extension arms, knuckle hoist and forklift platforms. Again, before use you should always consider whether they are the most appropriate means and equipment for your purpose.

When using any of these it is important to remember that the plant should be set up on a firm level surface and must be designed as suitable for lifting personnel. You should never climb out of any platform at height. Using a safety harness is vital on all equipment apart from scissor hoists. If these machines fail, the person using the platform risks being thrown from the bucket of the machine.

Power Operated Elevated Work Platforms (EWP)

EWPs include cherry pickers, scissor hoists, fixed head crane baskets etc. and are specialised pieces of equipment. It is essential that the correct type of machine is used for the job and that it is set up and used by a competent operator.

If you are hiring this equipment, make sure you have been given a specific demonstration and clear legible instructions on its use and that you are competent to use the equipment. Remember that you may need to hire other fall protection equipment such as a safety harness.

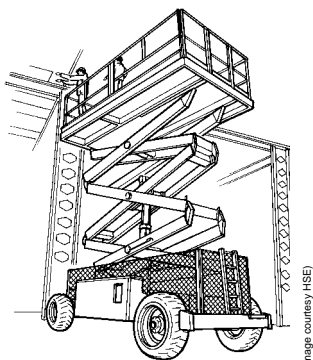
Before You Use an EWP:

Ask yourself, have you:

- checked that the machine is the correct type for the intended work?
- been trained to operate that particular type of machine?
- made sure the machine will not be overloaded or used as a crane?

Also ask:

- has the machine been inspected and tested within the previous 6 months? (simply check the certificate on the machine – if it is not current, **don't** use it)
- is the EWP set up on firm level ground with all support legs fully extended?



(Image courtesy HSE)

There are a wide range of EWPs available to provide access for almost any work at height.

- could the machine create a hazard (might the boom swing out blocking roads etc.)?
- is it at least 4 metres from power lines?
- is the person in the bucket of the platform wearing a safety harness with a lanyard attached to an approved anchor point inside the bucket? (this excludes scissor hoists)
- is the lanyard just long enough to provide free movement within the confines of the bucket to carry out the work safely?

Remember: never climb out of an elevated work platform at height, and never exceed the Safe Working Load (SWL) displayed on the platform.

Crane Lift Platforms

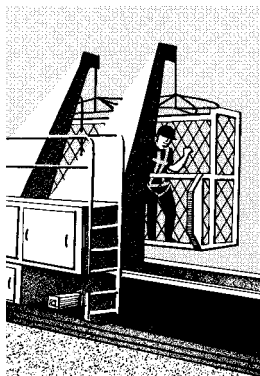
Suspending a working platform from a crane should only be used when no other practical and suitable method is available. The platform must be designed and tested by a *Registered Engineer* and have a specified Safe Working Load (SWL).

Before You Use a Crane Lift Platform:

Ensure that:

- for platforms with gates, these gates can be secured in position, and open inwards or slide sideways, and are self closing
- any platforms without gates are fitted with guardrails, midrails and toeboards
- a safe means of access is provided
- cranes used with suspended work platforms have a power lowering capability and free fall capability is 'locked out'
- the SWL on the side of the platform is not exceeded
- the crane has been inspected by the operator each day it is in use
- the crane operator is at the controls at all times the platform is in use when a work platform is suspended from a hook
- the person using the platform has discussed the operation of the crane and platform with the crane operator
- there is a direct line of communication (by line of sight or phone) between the two at all times

- all shackles are moused
- the person on the platform is wearing a safety harness with a retractable lanyard secured (when the platform is suspended from the hook, the lanyard must be secured to the crane hook block, so that it won't dislodge if the platform becomes unstable)
- the lanyard is just long enough to provide free movement within the confines of the bucket.



An example of one type of Building Maintenance Unit.

Building Maintenance Units (BMUs)

BMUs are structures or trolleys installed permanently on a building or structure, designed to raise or lower a cage or swinging stage for building maintenance.

Before You Work from a BMU:

Ensure that:

- you are trained and competent to use the BMU
- safety lines and harnesses are correctly worn at all times
- regular maintenance checks are carried out
- a log book is kept for inspection and you have seen it before any use
- a cell phone or RT is available for emergency situations.

Forklift Platforms

Work platforms should only ever be used on forklift trucks when designed specifically for the purpose and for the specific machine using them.

Before You Use a Forklift Platform:

Ensure that:

- the operator holds an appropriate certificate of competency and remains at the controls at all times the platform is in use
- the platform is fitted with guardrails, midrails and toeboards and any gates open inwards and have a spring loaded catch
- there is a 2 metre high guard wide enough to protect people from the moving parts of the mast
- the tilt lever is locked out or made inoperable wherever possible

- the platform is secured to the forks so that it cannot be displaced
- the SWL on the side of the platform is not exceeded
- a safety harness with a lanyard is worn that allows free movement within the platform.

Remember: forklift platforms are for raising and lowering a person to a place of work – *not* for transportation around the site.



A forklift platform with the user wearing a safety harness and lanyard.



Never raise or carry a person on the tynes of a forklift.

(Images courtesy WorkSafe Western Australia)

Vehicle Extension Arms (Knuckle Hoist Booms)

It is important that these are used only for their intended purpose and only if the operator has been specifically trained in their use.

Digger / Loader Buckets

These are not designed to be used as working platforms or for lifting personnel.

Tower Cranes

Erecting and dismantling tower cranes is another area where safety when working at height is essential. It must be carried out by workers under the personal supervision of a trained and experienced person in this area. When you are carrying out erection climbing and dismantling work at height, a safety harness and appropriate lanyard must be used.



Mechanical plant being used to inspect a fragile/brittle roof.

(Image courtesy HSE)

Working on Roofs – SOLUTIONS

All work on roofs – whether erecting new roofs, maintaining existing roofs, or simply having to work on a roof – requires specific care.

Falls through brittle and fragile roofing, roof penetrations, or between purlins or over perimeter edges are among the major causes of injury when working on roofs – both residential and commercial. There are permanent proprietary systems (such as eye bolts to attach lines, fixings and brackets) that allow for fall prevention systems to be used, and these should be installed and used wherever possible.

General Roof Work

Before erecting or fitting roofing material to new or existing roofs, you need to decide on the method that will provide the greatest degree of safety while working.

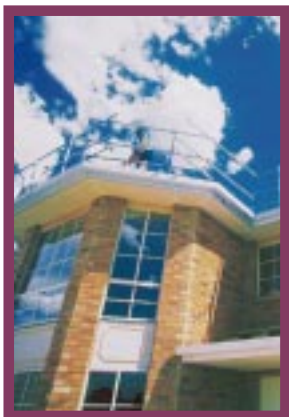
Before working on any Roof:

You should always:

- design the work method to reduce the amount of time you are working at height
- use flat roof walkways or roof ladders unless the roof is specifically designed to walk on (refer page 16).

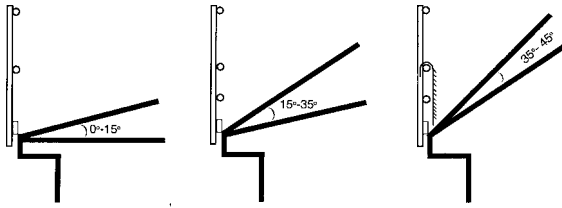
Also consider:

- scaffolding the perimeter of the building to provide a perimeter guardrail to the roof area (consider the need for extra ties to withstand an impact to the guardrail)
- installing a perimeter/edge guardrail system
- installing a false floor under the roof
- using safety mesh in place of ordinary netting
- using scissor hoists or other elevated work platforms
- correctly rigging safety nets
- using fall arrest systems such as inertia reels and static lines
- the proximity of any overhead power lines.



(Images courtesy Guardrail Systems Ltd.)

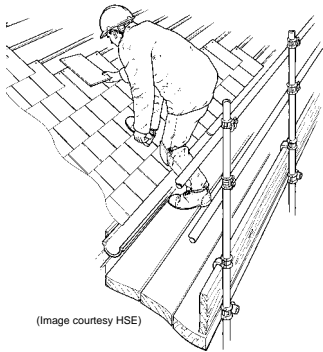
Use of a perimeter/edge guardrail system is an excellent means of preventing a fall from an edge or roof of any angle.



(Image courtesy WorkSafe Western Australia)

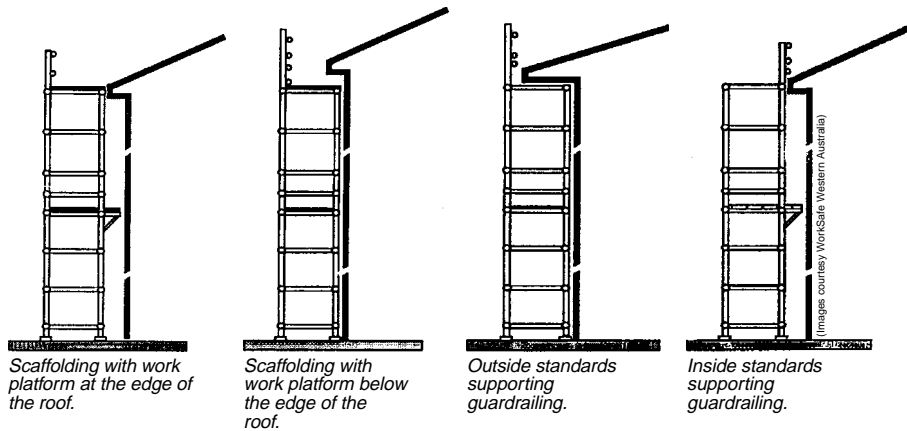
Roof edge/perimeter guardrails

For flatter angled roofs (0-15 degrees), a guardrail with midrail and toeboard fitted should be used. As the angle increases, a bottom rail (between the midrail and roof) needs to be added. For steeply pitched roofs (35-45 degrees), infill panels (to reduce any injury if the roofer slides into the railing and also to prevent objects sliding off the roof) should be added at least up to midrail height.



(Image courtesy HSE)

Scaffolding the perimeter of a house or building can also provide an effective perimeter guardrail, as well as providing a safe working platform to roof level.



Scaffolding with work platform at the edge of the roof.

Scaffolding with work platform below the edge of the roof.

Outside standards supporting guardrailing.

Inside standards supporting guardrailing.

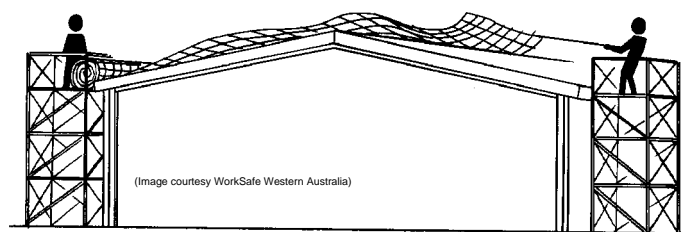
Access to the roof is an important area to consider – both for the job at hand and for work in the future. Where a worker is required to work close to the edge of a roof, fall protection must be provided.

There are also specific requirements for access for the maintenance of plant. Roofs that need regular cleaning or maintenance should be fitted with permanent perimeter protection and access ladders. Skylights or other brittle areas should have safety mesh fitted under them or guardrails fitted around them.

Safety Mesh & Safety Nets

When erecting a new roof, the use of safety **mesh** instead of wire netting, in conjunction with appropriate edge and perimeter protection, is a preferred method of fall protection. Safety mesh not only protects the roofer, but also provides protection in the future for those who may need to gain access to an area where brittle or fragile roofing is fitted (such as PVC roofing, skylights etc.)

Safety **nets** on the other hand are fitted temporarily as an additional means of fall protection. They can be particularly useful during industrial roof work – providing greater freedom of movement – and can be installed in such a way as to minimise the distance of a fall, reducing the chance of an injury when compared with a safety harness.

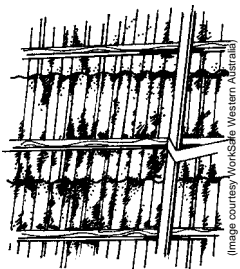


One means of installing safety **mesh** across a roof prior to fixing it in position.



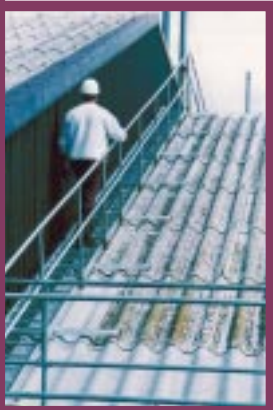
Safety **nets** in use for industrial roof work.

Remember: these are additional means of fall protection. Further fall protection equipment will still be needed, particularly while fitting safety mesh or safety nets or when working close to roof perimeters.



(Image courtesy WorkSafe Western Australia)

It is important to inspect the underside of every roof before working on it – deterioration of roof material may not be apparent from the upper surface.



(Image courtesy HSE)

A permanent roof walkway giving safe access on a brittle/fragile roof.



Brittle and Fragile Roofing

Brittle or fragile roofing can be a problem on both new and existing roofs.

Before carrying out work on any existing roof, you need to inspect the roof from the underside for structural soundness to ensure it can sustain the weight of the people required to work on it.

When Inspecting an Existing Roof for Soundness:

Ask yourself:

- are there any visible signs of corrosion, rusting, rotting or low grade timber with knotting etc. which may indicate weakness?
- are there any unsupported fabric roofs (such as PVC roofing etc.) that may not support the worker?
- are there any areas with moss or lichen which may cause slipperiness?

In all cases where you are required to walk or work on a roof (particularly where the roofing material is brittle or fragile and there is no safety mesh or sarking), a suitable means of protection from a fall through the roof must be provided.

And remember: treat any roof that hasn't been inspected as a brittle or fragile one.

Protection could include:

- providing temporary roof ladders or flat roof walkways of sufficient strength to support the workers and their equipment (remember: flat roof walkways must be fitted with full width cleats) (see page 16)
- providing correctly rigged individual fall arrest systems (such as a safety harness) complete with anchorages and safe access to the anchorage
- providing walkways for permanent roof access.

Permanent warning signs to indicate the existence of brittle or fragile roofing should be encouraged.



(Image courtesy HSE)

An access system for short term maintenance work on a brittle/fragile roof.

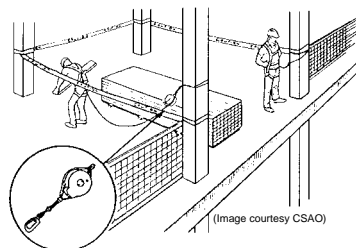
Fall Protection Systems / Safety Harnesses – SOLUTIONS



Fall Restraint

Fall restraint includes methods such as perimeter edge guardrailing, roof edge protection as well as fall restraint systems such as travel restraint devices. These will actually **prevent** a worker from falling over the edge (where a fall is taken to be a fall from the roof or unprotected edge of a building).

Any rigging of anchorages and lines for these systems is an extremely specialised area and they should only be used if you have been fully trained.



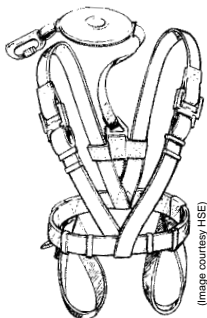
When guardrails are temporarily removed, a safety harness should be worn with a lanyard attached to the structure.

Fall Arrest

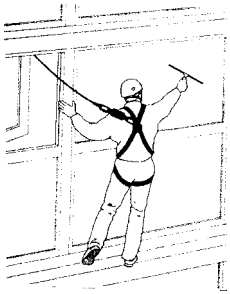
Fall arrest systems and their related safety harnesses, lines etc. are designed to catch and hold a person in the event of a fall. They are not designed to hold a person in a working position.

Fall arrest systems only provide protection for the person using the safety harness once the worker has already fallen – they don't **prevent** falls. This is why they should only be used when there is no other form of fall restraint available.

Use of safety harnesses, fall arrest systems and the related rigging of static lines, anchorages etc. is an **extremely skilled and specialised area** and should only be used as a back up, and when the user has been fully trained. In most situations there is always another means of **preventing** a fall (such as scaffolding the work, working from an EWP, perimeter edge protection etc.) instead of relying on a fall arrest system by itself.



A typical safety harness with leg and shoulder straps and lanyard – this lanyard is also fitted with a shock absorber.



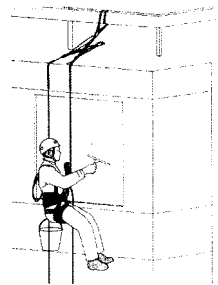
A fall arrest system in use.

Where a fall has been arrested, the person **must** be rescued immediately. Faintness and serious blood circulation problems can occur which can lead to **brain damage or death in minutes**.

For this reason, **never** use these systems unless you have been fully trained, and only where there are emergency procedures in place which enable a rescue within a few minutes.

Never work alone and always have emergency procedures in place.

Fall arrest systems should be relied on only as a last resort, or where there is no other means of fall restraint available when working at height.



A rope access system in use.

Rope Access / Abseiling

These systems hold the person in a working position and are also an extremely specialised area. They should only be used to carry out work if you are fully qualified and specifically trained in their use.

Fall restraint/arrest systems and equipment must be designed and manufactured to recognised national and international standards. Fixings (such as eye bolts and anchorage points to attach lines etc.) should be permanently fitted, and must be assessed by a *competent person* and/or designed by a *Registered Engineer*.

Other Areas to Consider – SOLUTIONS

Erection of Structural Steel

Like all work at height, planning when erecting structural steel can often avoid the need to work at height altogether.

Consider:

- connecting as much steel work as possible on the ground or from a working platform
- planning for connections to be at points that are safe and easy to reach
- using remote release shackles and systems on lifting gear
- using elevated work platforms wherever possible, rather than walking on the steel.

Where you must work at height, precautions mentioned earlier apply equally to the erection of structural steel.



(Image courtesy / NSCA)

And remember: never walk on the top flange of the steel.

Excavations

Many associate the requirements for preventing falls to only apply when working at heights above ground level. This is not the only area where a fall can result in injury. Requirements also relate to falls into excavations such as ditches and trenches.

It is therefore important when working in or around any excavation where any person can fall more than 3 metres (or any distance where a fall could result in harm) that a suitable means of fall prevention is in place.

This could include:

- making sure edge protection is provided for the excavation or excavated face
- extending shoring to at least 1 metre above the top of the excavation (essentially creating a guardrail around the excavation)
- using a suitable static line and safety harness if practicable.

Falsework & Formwork

Falsework and Formwork often involve extensive work at heights. They are both temporary and the risk of a fall is often very high. Therefore fall prevention needs to be carefully considered and used while erecting falsework or installing formwork or precast concrete units.

Consider:

- erecting guardrails at the top working level before installing the formwork or precast units
- attaching guardrails to all formwork before installation
- constructing formwork which includes purpose-built working platforms and guardrail systems
- using a safety harness and appropriate lanyard when erecting falsework at heights of 3 metres or more (these can be attached to a fixed static line or to completed sections of the falsework provided that the anchorages are adequate)
- running static lines along the length of the building or falsework at the upper-most level.

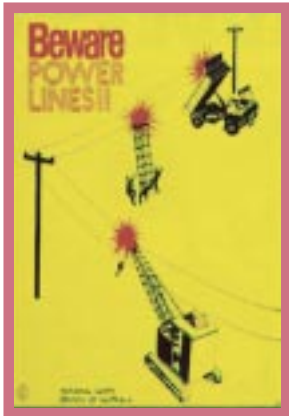
Further Information

Powerlines

Always consider the danger involved when working near powerlines.

Remember to keep a 4 metre **minimum** clearance in all directions – that's up, down and sideways. And allow an additional clearance to cover the possibility of the load getting away and swinging in the direction of the lines, or the lines moving with the wind or their electrical load.

Where it is not possible to work within these clearances, you need to work in consultation with the powerline owner. Where you are going to be working near powerlines for any extended length of time, talk with your line owner about using insulated cover up gear, or getting the lines temporarily moved.



(Image courtesy NSCA)

Remember: treat all powerlines as live.

Physical Fitness

Physical fitness and alertness are important in all types of construction work – but especially when working at height.

Never work at height if you:

- are under the influence of alcohol or drugs (even if you used these substances the night before they can still affect you the next day)
- feel dizzy or unwell (conditions such as an inner ear infection can affect your sense of balance)
- are taking prescription medicines (ask your doctor if they could affect your fitness to work at height).

If you have a medical condition, discuss this with your employer. Be aware that fatigue, stress and emotional upsets can make you prone to injuries in general – including falls from height.

A Word About Site Safe

Site Safe is a small, independent, not-for-profit organisation set up by the entire construction industry, governed by a Board of Directors with representatives from throughout all the major sectors of the construction industry. We continue to work with all sectors of the construction industry, in every facet of health and safety, by taking the lead in promoting construction health and safety. This guide is another step towards the goal of reducing construction injuries and deaths.

Acknowledgments


Site Safe would like to thank the industry project team who worked on the development of this guide:

- Bruce Lambie – Construction Inspector, OSH
- Kevin Lockley – Health and Safety Manager, Fletcher Construction
- Brian Olsen – National Quality and Safety Manager, Mainzeal
- Ian Shepherd – Manager Occupational Safety & Health, BCITO
- Grant Wilson – Construction Inspector, OSH

Site Safe would also like to thank the many associations, organisations, companies and individuals from throughout all sectors of the construction industry who were involved in the development and consultation of the guide, as well as those who provided images, diagrams and photographs – OSH in particular, who also assisted with the printing of the guide. Site Safe and the construction industry thank all those involved.

Health & Safety Executive images: Crown copyright material is reproduced with the permission of the Controller of Her Majesty's Stationary Office.

Key Terms and What They Mean

Note: in this section key terms as defined under the HSE Act (1992) or the HSE Regulations (1995) are identified with the symbol 

All practicable steps

“All practicable steps”, in relation to achieving any result in any circumstances, means all steps to achieve the result that it is reasonably practicable to take in the circumstances, having regard to –

- a) The nature and severity of the harm that may be suffered if the result is not achieved; and
- b) The current state of knowledge about the likelihood that harm of that nature and severity will be suffered if the result is not achieved; and
- c) The current state of knowledge about harm of that nature; and
- d) The current state of knowledge about the means available to achieve the result, and about the likely efficacy of each; and
- e) The availability and cost of each of those means.

This means, in effect, actions that are reasonably able to be taken in the specific circumstances to achieve the result.

Competent Person

A person who has, through a combination of training, education and experience, acquired knowledge and skills enabling that person to correctly perform a specified task. This is more than simply a person’s own self opinion, and should be based on sound training, experience and knowledge.

Construction work

- a) Means any work in connection with the alteration, cleaning, construction, demolition, dismantling, erection, installation, maintenance, painting, removal, renewal, or repair, of
 - (i) Any building, chimney, edifice, erection, fence, structure, or wall, whether constructed wholly above or below or partly above and partly below, ground level;
 - (ii) Any aerodrome, cableway, canal, harbour works, motorway, railway, road, or tramway;

- (iii) Anything having the purpose of drainage, flood control, irrigation, or river control;
- (iv) Any distribution system or network having the purpose of carrying electricity, gas, telecommunications or water;
- (v) Any aqueduct, bridge, culvert, dam, earthwork, pipeline, reclamation, reservoir or viaduct;
- (vi) Any scaffolding.

And

- b) Includes any work in connection with any excavation, preparatory work, or site preparation carried out for the purposes of any work referred to in paragraph a) of this definition.
- c) Includes any work referred to in paragraph a) or paragraph b) of this definition carried out underwater, including work on buoys, obstructions to navigation, rafts, ships, and wrecks.
- d) Includes the use of any materials or plant for the purposes of any work referred to in any of paragraphs a) to c) of this definition.
- e) Includes any inspection or other work carried out for the purposes of ascertaining whether any work referred to in any of the paragraphs a) to c) of this definition should be carried out.

But

- f) Does not include any work in any mine, quarry or tunnel.

While work in mines, quarries and tunnels is excluded from the definition of 'construction work' given in the HSE Regulations, this document will still provide a useful guide for these types of work.

Registered Engineer

A practicing structural engineer, skilled and experienced in the particular area of design in which they are working/designing.

For more information you can visit the Site Safe New Zealand web site at **www.sitesafe.org.nz**, or contact Site Safe at 22 The Terrace, Wellington. Phone (04) 499-4052, fax (04) 499-4053 or e-mail comments@sitesafe.org.nz.

Other Site Safe Guides Available



Construction Safety Management Guide

Best Practice Guidelines in the Management of Health and Safety in Construction

The first of the Site Safe guides looks at the basic roles, responsibilities and key tasks for health and safety for all those involved in the construction process – from the client and designer/adviser, to the head contractor and subcontractors.

Written in very user-friendly language and colour coded for ease of reading, the guide gives a brief overview of the purpose and requirements of the HSE Act – including clarifying the role of the Principal and exactly who can be one on a construction project. It then breaks the construction process down into stages, outlining the key tasks and responsibilities for health and safety that each party has during the different stages of a project.



Health and Safety Guide for the Tendering Process

Best Practice Guidelines for Health and Safety in the Construction Tendering Process

In the same user-friendly style as the first guide, the '*Tendering Guide*' looks specifically at the tendering process - an area where health and safety can be factored in at the front end of the construction process. The guide outlines the key stages of the tendering process, and then breaks down these stages into the responsibilities for health and safety of each of those involved in the process – the client, the designer/adviser and the tenderer. The guide then focuses on what each group should be doing during the specific stages of tendering to best factor health and safety into the process.

'How To' Guide for Developing a Health and Safety Policy

A brief pamphlet setting out the basic steps and key objectives involved in developing a Health and Safety Policy - a policy being the first step towards a safe place of work. It provides the basis and commitment to implementing safe work practices and providing the foundation of an effective health and safety programme.

A copy of each of the above guidelines is free when you become a Site Safe member (see page 42) – with additional copies only \$5 each for members. For all non-members, the guides are priced at \$10 per copy. Contact Site Safe for further details.

Appendix – References

For more information, or for any area not covered in this guide, refer to the organisations or specific publications below:

Occupational Safety and Health Service (OSH) -

Approved Code of Practice for Cranes and Lifting Appliances

Approved Code of Practice for Power-Operated Elevating Work Platforms

Approved Code of Practice for the Safe Erection and Use of Scaffolding

Approved Code of Practice for Safety in Excavations and Shafts for Foundations

Building Maintenance Units and Powered Swinging Stages

Guidelines for the Prevention of Falls

Power Crane Association of New Zealand

Code of Practice for Crane Lifted Work Platforms

Crane Safety Manual

Roofing Association of New Zealand

Guidelines for Safe Working at Height for Residential and Light Commercial Roofing

Industrial Rope Access Association of New Zealand

Standards New Zealand

Legislation -

Health and Safety in Employment Act 1992

Health and Safety in Employment Regulations 1995

Building Act 1991

Become a Site Safe Member

You can become a member of Site Safe simply by filling in the form below and either faxing or posting it with your payment to:

Site Safe New Zealand
Ground Floor, 22 The Terrace
WELLINGTON
Ph (04) 499 4052 Fax (04) 499 4053

Just some of what you will get for your membership:

- a certificate of membership and your name and details on the Site Safe *Directory of Members* on our website – an excellent marketing tool
- our quarterly newsletter, *Toolbox Talk* – with important health and safety information and advice
- all Site Safe products and services at reduced cost, including a copy of the *Construction Safety Management Guide*; the *Health and Safety Guide for the Tendering Process*, and our ‘How To’ *Guide for Developing a Health and Safety Policy* – all free to members
- a 15% discount on all safety gear purchased from Protector Safety Supply
- access to the best industry health and safety training at reduced cost.

See our website for more details (www.sitesafe.org.nz), or contact us here at Site Safe.



Membership Details:

Name Position

Organisation Order no.

Specific trade/area of work

Contact name Number of employees
(If company)

Address
.....
.....
.....
.....

Phone
bus. ()
home. ()
mob. ()

Fax ()

E-mail

Please register my annual membership to Site Safe New Zealand:

As an individual/sole operator @ \$100 (+GST) Total (incl. GST) **\$112.50**

As an employer with up to 5 employees @ \$100 (+GST) Total (incl. GST) **\$112.50**

or

As an employer with 6 or more employees @ \$20 per employee (+GST) Total (incl. GST)
(Approximate only. Fee negotiable for larger operations.)

Date ___ / ___ / ___ Signed

Method of Payment: Cheque enclosed Please invoice



