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Compliance code

Prevention of falls in general construction



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Preface

This compliance code provides practical guidance to those who have duties under the *Occupational Health and Safety Act 2004* (the OHS Act) or the Occupational Health and Safety Regulations 2007 (the Regulations) on how to comply with those duties or obligations.

It replaces the advice given in the Victorian Code of Practice No. 28 of 31 March 2004 made under the *Occupational Health and Safety Act 1985*. It was approved by The Hon. Tim Holding MP, Minister for Finance, WorkCover and the Transport Accident Commission, on 19 September 2008.

This compliance code was developed by WorkSafe Victoria. Representatives of employers and employees in the construction industry were consulted during its preparation.

This compliance code has adopted the content of the National Code of Practice for the *Prevention of Falls in General Construction* (2008) to the extent that it is compatible and consistent with the OHS Act and Regulations.

Employers, employees, self-employed persons and those with management and control of workplaces need to use the compliance code in conjunction with the Act and Regulations.

This compliance code is not mandatory. A relevant duty holder who complies with the compliance code will – to the extent the compliance code deals with their duties or obligations under the OHS Act and Regulations – be considered to have complied with their duties and obligations.

If conditions at the workplace or the way work is done raise different or additional risks not covered by the compliance code, compliance needs to be achieved by another means.

WorkSafe publishes guidance to assist with this process at **worksafe.vic.gov.au**.

Evidence of a failure to observe a compliance code may be used as evidence in proceedings for an offence under the OHS Act or Regulations. However, a duty holder will not fail to meet their duty or obligation simply because of a failure to observe a compliance code.

A WorkSafe inspector may cite a compliance code in a direction or condition in an improvement notice or a prohibition notice as a means of achieving compliance.

A health and safety representative (HSR) may cite a compliance code in a provisional improvement notice when providing directions as to how to remedy an alleged contravention of the OHS Act or Regulations.

The approval of a compliance code may be varied or revoked by the Minister. To confirm that this compliance code is current and in force, go to **worksafe.vic.gov.au**.

Introduction

Purpose

1. The purpose of this compliance code is to provide practical guidance to employers and self-employed persons on the prevention of falls in the general construction industry. It also provides guidance for other duty holders (see paragraph 9 onwards).

Scope

2. This compliance code applies to fall hazards associated with construction work.
3. Under the Occupational Health and Safety Regulations 2007 (the Regulations), construction work is any work performed in connection with the construction, alteration, conversion, fitting out, commissioning, renovation, refurbishment, decommissioning or demolition of any building or structure, or any similar activity.
4. Although this compliance code can be applied to house construction, it is not specifically tailored to this type of construction. It is therefore recommended that current WorkSafe guidance for the prevention of falls in housing construction be used in the first instance.
5. To avoid doubt, this compliance code does not apply to the assembly, inspection, servicing or repair of mobile plant.

Application

6. This code applies to employers, managers and controllers of workplaces, installers, erectors and commissioners of plant and self-employed persons in meeting their respective duties. The code may also be useful to employees and elected health and safety representatives (HSRs).

Consultation

7. By law, so far as is reasonably practicable, employers must consult with HSRs and employees on a range of matters that directly affect (or are likely to directly affect) their health and safety. In relation to this code, examples of consultation would include:
 - consultation during the hazard identification process
 - consultation on the selection of suitable risk controls to prevent falls
 - consultation on any proposed changes to prevention of falls practices.
8. For more information on the consultation provisions, see Appendix B.

Duty-holder responsibilities

9. *The Occupational Health and Safety Act 2004* (the OHS Act) places duties to ensure health and safety on various parties (called duty-holders) that apply to the prevention of falls at work.

Managers and controllers of workplaces

10. Managers and controllers of workplaces have a duty to ensure that risks at the workplace are eliminated or reduced so far as is reasonably practicable. This compliance code will assist principal contractors, as the managers and controllers of construction sites, to fulfil this aspect of their duty to ensure health and safety.

Employers

11. Employers have a duty to provide and maintain for their employees and contractors a working environment where fall hazards and risks, regardless of height, are eliminated or reduced so far as is reasonably practicable. They also have a duty to ensure, so far as is reasonably practicable, that the conduct of their undertaking does not expose anyone else to a risk of injury through falling.

Self-employed persons

12. Self-employed persons have a duty to ensure, so far as is reasonably practicable, that in conducting their business and work, no-one is exposed to risks to their health or safety. This compliance code will assist self-employed construction workers to fulfil this aspect of their duty to ensure health and safety.

Employees

13. Employees have a duty to take reasonable care for their own health and safety, and for the health and safety of others who may be affected by their actions, and to co-operate with their employer in complying with the OHS Act and Regulations. In particular, employees must not intentionally or recklessly interfere with or misuse any safety measures provided at their workplace.
14. This compliance code will assist construction employees to understand their employer's obligations for the prevention of falls and the recommended solutions to a range of fall hazards and risks commonly encountered on construction sites.

Designers of buildings or structures

15. Designers of buildings or structures have a duty to ensure, so far as is reasonably practicable, that buildings or structures are designed to be safe and without risks for people using them as workplaces. This duty applies to the intended end-use of the building or structure, including routine cleaning and maintenance, but does not extend to the construction phase.
16. This compliance code provides no specific advice on this matter. For further information, see WorkSafe's *Designing safer buildings and structures*.

Designers, manufacturers and suppliers of plant

17. Designers, manufacturers and suppliers of plant have a duty to ensure, so far as is reasonably practicable, that plant is safe and without risks when used properly. This compliance code provides no specific advice on these matters. For further information, see WorkSafe's *Your health and safety guide to plant*.

Installers, erectors and commissioners of plant

18. Installers, erectors and commissioners of plant have a duty to ensure, so far as is reasonably practicable, that nothing about the way an item of plant is installed, erected or commissioned makes its use unsafe or a risk to health. This compliance code provides some guidance on this matter as it relates to the provision and use of various types of plant commonly used to control the risk of falls in general construction.

What do the OHS Regulations require?

19. The Regulations place specific obligations on employers and other duty-holders. These obligations must be met in order for duty holders to fulfil their duty to ensure health and safety under the OHS Act.
20. In relation to the prevention of falls of more than two metres on construction sites, the Regulations require employers to:
 - identify all tasks that involve a fall hazard of more than two metres
 - eliminate all such hazards, so far as is reasonably practicable, by arranging for the task to be done on the ground or from a solid construction.
21. Where it is not reasonably practicable to perform a task on the ground or from a solid construction, employers must:
 - adopt a means of control, in accordance with a specified hierarchy, that reduces the risk of a fall so far as is reasonably practicable (see page 8)
 - document the control in a safe work method statement before the work commences
 - establish suitable and safe emergency procedures for rescue and first aid in the event of a fall occurring.
22. Employers must also ensure that any plant used as a means of control is fit for its purpose, safe to use in the particular work environment and is installed, erected and dismantled safely and without risks to health.

Duty-holder responsibilities

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23. After implementing any risk control, employers have a duty to review and where necessary revise the control:
 - before altering plant or systems of work involving the likelihood of a fall
 - after a notifiable incident involving a fall or the risk of a fall
 - if for any other reason the measure does not adequately control the risk
 - if asked to do so on reasonable grounds by an HSR.
 24. Employers who comply with these obligations are taken to have complied with these aspects of their duty to ensure health and safety under the OHS Act.
 25. This compliance code will assist construction employers to understand and fulfil these obligations. Employers who comply with the recommendations given in this compliance code are taken to have complied with these particular obligations.

Managing risks to prevent falls

Identifying fall hazards

26. Before work commences, all locations and tasks that may involve the risk of a fall need to be identified. This includes access to the areas where tasks are to be performed. Each task needs to be examined to determine whether there is a risk of falling. Tasks that need particular attention are those carried out:
- on any structure or plant being constructed or installed, demolished or dismantled, inspected, tested, maintained, repaired or cleaned
 - on a fragile surface (eg cement sheeting roofs, rusty metal roofs, fibreglass sheeting roofs and skylights)
 - on a potentially unstable surface (eg areas where there is potential for ground collapse including poorly backfilled or compacted ground, or unstable areas such as on top of stacks of building materials, timber pallets or bricks)
 - using equipment to work at an elevated level (eg when using scaffolds, elevating work platforms or portable ladders)
 - on a sloping or slippery surface where it is difficult for people to maintain their balance (eg on glazed tiles)
 - near an unprotected open edge (eg near perimeters without guardrails or incomplete stairwells)
 - near a hole, shaft or pit into which a person could fall (eg trenches, pile holes or service pits).
27. Further guidance is given in Appendix H.

Assessing the risk of a fall

28. If a task involving a fall hazard has been identified, the risk of a fall can be assessed by determining:
- the likelihood of a fall occurring
 - the potential distance a person could fall
 - the extent of harm that a person could receive in the event of a fall.
29. The ultimate effectiveness of any risk assessment is dependent on the quality of the information available. Therefore, people carrying out risk assessments require the necessary information, knowledge and experience of the work environment and work processes.
30. In carrying out a risk assessment, it is helpful to break down each activity or process into a series of parts or smaller tasks and assess each one separately.

Managing risks to prevent falls

Advice for doing risk assessments

31. Ways to assess the risk arising from each identified hazard include:
- looking at similar workplaces or processes
 - looking at the workplace's previous incident and injury reports and data for falls
 - consulting with HSRs (if any) and other employees
 - looking at the way tasks/jobs are performed
 - looking at the way work is organised
 - determining the size and layout of the workplace
 - assessing the number and movement of all people at the workplace
 - determining the type of operation to be performed
 - identifying the type of machinery/plant to be used
 - assessing the adequacy of inspection and maintenance processes
 - examining the way all material and substances are stored and handled
 - assessing what knowledge and training is needed to perform tasks safely and the adequacy of current knowledge and training
 - examining the adequacy of procedures for all potential emergency situations (eg incidents and rescues).

Can the same risk assessment be used for more than one task?

32. If similar tasks or processes are undertaken in a number of different work areas or workplaces, a single risk assessment may be sufficient.
33. A single or generic risk assessment will only be appropriate if the hazards and risks for the work areas being covered by the assessment are the same or similar.
34. For example, if a generic assessment is undertaken by an industry association as a model to be used by a number of different employers with essentially identical workplaces, the person responsible for completing the risk assessment at each workplace is responsible for ensuring that the generic assessment is valid for their workplace.
35. As with risk assessments generally, workers and their HSRs (if any) must be consulted when carrying out or adopting generic risk assessments. See Appendix B for more information on consultation.

Controlling the risks

36. An employer's primary duty is to eliminate the risk. If this is not reasonably practicable, the risk must be reduced to the minimum level possible, so far as is reasonably practicable. To do this, there is a preferred order (or hierarchy) of risk-control measures, ranging from the most effective to the least effective, that must be applied.

Hierarchy of control measures

37. The first priority is always to eliminate the risk of a fall. In other words, ensure a fall from height cannot occur. Ways to do this include designing out the risk or working on the ground or from a solid construction. These are level 1 controls.

38. If it is not reasonably practicable to eliminate the risk of a fall through the application of a level 1 control, the risk must be **minimised** through the application of control measures lower down in the hierarchy – level 2 to level 5 controls (see paragraph 41).
39. Where it is reasonably practicable to undertake part of a task using a higher order control, that control must be used to the extent possible. Where a risk of a fall remains, then the next level of controls must be applied wherever reasonably practicable.
40. In cases where a person could fall a distance greater than two metres, and physical fall prevention is not able to be used because it is not reasonably practicable, employers need to ensure that the corresponding safe-work method statement records contain a description of the administrative control to be used, and a description of the task to which that administrative control relates.

41. The hierarchy of control measures is:

Level 1: Undertake the work on the ground or from a solid construction (see page 15).

Level 2: Undertake the work using a passive fall prevention device (see page 17).

These include:

- scaffolds
- perimeter screens
- step platforms
- perimeter guardrailing
- elevating work platforms
- guardrailing edges of roofs
- mast climbing work platforms
- protection for trenching works
- work boxes
- safety mesh.

Level 3: Undertake the work using a work-positioning system (see page 24).

These include:

- travel-restraint systems
- industrial rope-access systems.

Level 4: Undertake the work using a fall-arrest system (see page 26).

These include:

- catch platforms
- safety-harness systems (other than travel-restraint systems).

After considering all of the above, if no reasonably practicable control measure has been identified, a level 5 control may be used.

Level 5: Undertake the work from ladders (see page 27) or implement an administrative control (see page 29).

Operator's skill

42. The control hierarchy generally ranks solutions requiring minimal operator skill at a higher (and therefore preferable) level than solutions requiring substantial or complex operator skill.
43. This principle needs to also be applied when deciding between two otherwise equal solutions from the same hierarchy level. For example, providing all other factors are equal, a perimeter guardrail – which requires no ongoing skill from the person it protects – will be chosen in preference to an elevating work platform.

Other risk control considerations

Make sure control measures are safe and don't introduce new risks

44. When selecting the most practical control measure, any non-fall risks associated with those measures must also be considered. Non-fall hazards could include electrical hazards such as contact with overhead and temporary electrical cabling, and crushing and entanglement from plant such as elevating work platforms.
45. Make sure that the control method that is selected does not expose those installing, erecting or removing it (such as scaffolders) to a greater risk than the one it is designed to control.
46. If plant or equipment is used to control the risk, it must be 'fit for purpose'; that is, it must be designed and constructed for the task and the working environment.

Personal protective equipment

47. Personal protective equipment (PPE), such as safety footwear, gloves and hard-hats provide additional protection when used in conjunction with fall prevention. However, they should not be used as the only control measure.

Monitoring and review of control measures

48. Implementing a control measure is not the end of the risk management process. Control measures must be monitored and reviewed to ensure that they continue to control the risks they were established for.
49. Employers are required to review and if necessary revise risk-control measures:
 - before altering plant or systems of work involving the likelihood of a fall
 - after a notifiable incident involving a fall or the risk of a fall
 - if, for any other reason, the measure does not adequately control the risk.
50. An employer must also review the risk-control measures upon receiving a request for review from an HSR where the representative believes, on reasonable grounds that:
 - any of the three circumstances listed above exist
 - the employer has failed to properly review the risk-control measures, or
 - in conducting a review of, or revising, the risk-control measures, the employer has failed to take into account any of the circumstances listed above.
51. Fall prevention measures need to be monitored regularly to make sure that workers are using them properly. Where an alteration of specific plant or a fall prevention measure is to be undertaken, the employer needs to make sure that the integrity of the system is maintained and that clear arrangements are in place with subcontractors.

Information, instruction and training

52. Information, instruction and training about fall hazards, risks and control measures must be provided to those undertaking the construction work.
53. This will help them to understand:
 - the fall hazards to which they are exposed
 - the risk of injury associated with the task
 - why control measures are needed and how to use them properly
 - what action to take if there is an incident.
54. The amount and type of information, instruction and training required will depend on the severity of the hazard and the risk involved. It will also depend on the level of skill required to operate or use the control measure. Tasks involving complex work procedures or control measures will require more comprehensive training.
55. In addition, there are licensing requirements for workers carrying out scaffolding and dogging and rigging work, plus for the operation of certain types of elevating work platforms and for the use of crane-lifted workboxes.
56. All information, instruction and training needs to be provided in a form that can be understood by all workers. This may include providing information in languages other than English.
57. While training is important, it is not a substitute for effective control measures.

Working at heights not exceeding two metres

58. A fall from almost any height can result in serious injury or death. It is possible that a number of factors can combine to create a dangerous situation, making the hazard identification and risk assessment process essential for work at any height.
59. This section provides advice to assist employers to comply with their legal obligations for construction work at heights not exceeding two metres.

Duties

60. Employers must eliminate, so far as is reasonably practicable, any risk to health or safety associated with construction work. This includes risks to health or safety arising from fall hazards.
61. Workers must ensure that their work does not put others at risk and that they undertake work at height in accordance with the information, instruction and training that they have received.

Risk management

62. In situations where people are working at heights not exceeding two metres, the standard risk management model needs to be adopted. This involves identifying fall hazards and selecting control measures that provide the highest level of protection that is reasonably practicable.
63. Selecting the highest level of protection that is reasonably practicable does not need to be complicated. In most cases employers can simply:
 - look for the hazards
 - decide who might be harmed and how
 - consider ways of doing the task more safely if a risk exists
 - take action to eliminate the risk, and if this is not reasonably practicable, reduce the risk.

Information, instruction and training

64. An employer must ensure that any information, instruction and training relating to the hazards, risks and control measures identified in the risk management process for working at heights not exceeding two metres is provided to those engaged to do the construction work.
65. The amount and type of information, instruction and training that needs to be provided will depend on the risk involved. The complexity of the work procedures and the type of fall prevention measures adopted also need to be taken into account.

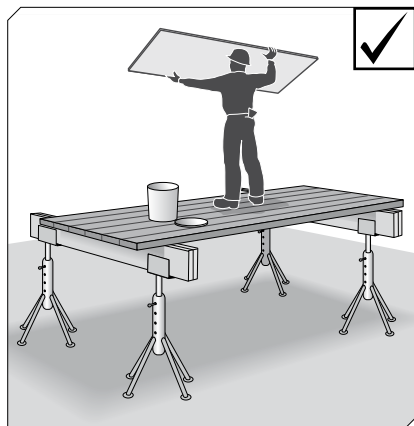


Figure 1: A split-head trestle scaffold.

Examples of control measures for work up to two metres

Hazard: Worker using stilts

66. The use of stilts raises a worker's centre of gravity, making them much more unstable and prone to tripping, overbalancing or falling through openings in floors or walls. Guardrails are usually not designed for people using stilts and will not protect the user from falling. Workers sometimes use an unstable support (such as a stepladder to put on stilts) which exposes them to the risk of falling.

Solution: Provide a split-head trestle scaffold

67. Split-head trestle scaffolds are quick and easy to erect and can be configured in a variety of ways to suit the particular job (see Figure 1). They are particularly useful for light and medium duty activities such as plastering, painting and general fit-out and finishing.

Note: Where scaffolds are not suitable, the advice in WorkSafe's Guidance Note *Use of plasterers' stilts* needs to be followed.

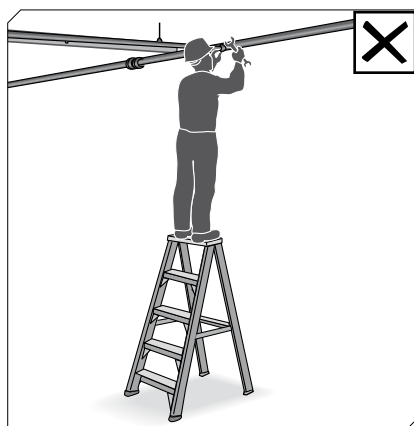


Figure 2: Hazard – standing above second tread of stepladder.

Hazard: Performing a task from a stepladder

68. Most ladder-related injuries occur as a result of falls from low heights. Sideways tipping is the cause of most stepladder injuries, and this risk increases as the worker ascends the ladder. In this case, the worker is working above the second tread from the top of the ladder and is at extreme risk of falling (see Figure 2). The worker is often working alone and does not have anyone to hold the stepladder to stabilise it.

Solution: Use a step platform

69. A commercially available step platform provides a safer alternative to a stepladder, especially where the task involves working at height for extended periods or restricted vision (such as welding or other hot work). The step platform is extremely stable and provides a much larger work surface than the stepladder (see Figure 3). Some models are collapsible.

Portable ladders

70. For general advice on the selection and maintenance of ladders, see page 27.

71. People using ladders should not:

- handle or use ladders where it is possible for the person or the ladder to make contact with powerlines
- use metal or metal-reinforced ladders when working on live electrical installations
- set up the ladder in places, such as driveways and doorways, where a person or vehicle could hit it (if necessary, erect a barrier or lock the door shut)
- use a stepladder near the edge of an open floor, penetration or on scaffolding to gain extra height
- over reach (the worker's belt buckle needs to remain within the ladder stiles throughout the work)
- use any power (air, hydraulic, electric or battery) equipment or tool specifically designed to be operated with two hands and which may require the operator to brace themselves against the high level of torque exerted by the tool
- carry out work such as arc welding or oxy cutting, unless step platforms or other temporary work platforms are not feasible and the task is of short duration and a safe work procedure is followed

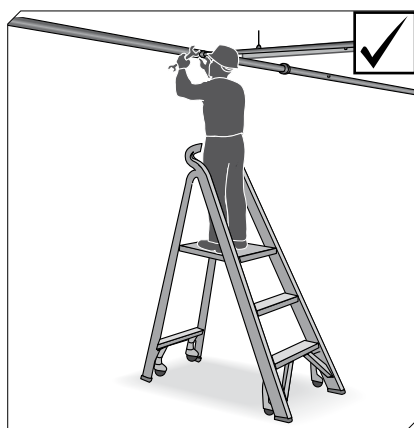


Figure 3: A step platform provides a stable work surface.

- use tools requiring the use of both hands and dynamic movement, such as axes and crowbars
 - use tools that require a high degree of leverage type force (such as 'Stillsons' or pinch bars) which, if released, may cause the user to overbalance or fall from the ladder
 - work over other people
 - allow anyone else to be on the ladder at the same time.
72. Except where additional and appropriate fall protection equipment is used in conjunction with the ladder, any person using a ladder should not:
- face away from the ladder when going up or down, or when working from it
 - stand on a rung closer than 900mm to the top of a single or extension ladder
 - stand higher than the second tread below the top plate of any stepladder.
73. A ladder must be set up on a surface that is solid, stable and secure. It must also be set up to prevent it from slipping.

Trestle scaffolds

74. Trestle scaffolds are only suitable for tasks requiring a work platform at a height of two metres or less. If a trestle scaffold is used, make sure it is right for the job and set up correctly.
75. When adjusting the height of a trestle scaffold, make sure that only the purpose-designed pins are used. Do not use nails or pieces of reinforcing bar.
76. Further guidance on trestle scaffolds is provided in AS/NZS 4576 *Guidelines for scaffolding*.

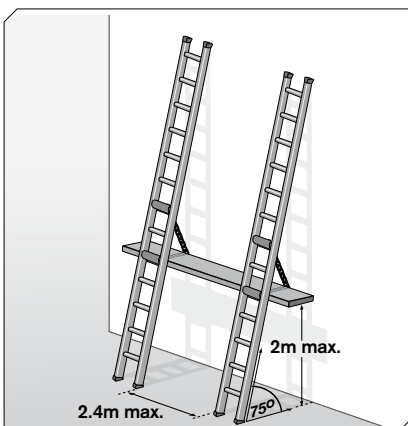


Figure 4: A ladder-bracket scaffold.

Ladder-bracket scaffolds

77. Ladder-bracket scaffolds are constructed from single or extension ladders with brackets to support scaffold planks (see Figure 4). They are only to be used for very minor tasks where the worker cannot fall more than two metres.
78. When using ladder-bracket scaffolds, observe the following:
- only use industrial grade single or extension ladders
 - pitch the ladders at a horizontal to vertical slope ratio of 1:4
 - make sure the ladders are firmly footed on a hard level surface
 - secure the ladders against movement
 - keep the horizontal distance between brackets to 2.4 metres or less
 - make sure the planks are genuine scaffold planks in good condition
 - provide barricades or other suitable controls to prevent traffic damage
 - no more than one person can be supported in any bay of the scaffold
 - do not stack materials on the working platform.

Working at heights above two metres

79. Depending on the circumstances, serious injury or death can result from a fall from any height. However, the likelihood of serious injury or death increases with the height from which a person falls.
80. This section provides advice to assist employers to comply with their legal obligations for construction work at heights exceeding two metres.

Duties

81. Employers' duties in relation to work involving the possibility of a person falling a distance greater than two metres have been set out in paragraphs 19 to 23.
82. Employers must not perform construction work where there is a risk of a person falling more than two metres unless:
 - a safe work method statement (SWMS) has been prepared before the work commences
 - the work is performed in accordance with that statement.

Safe work method statements

83. A SWMS is a document that:
 - identifies work that is high-risk construction work
 - states the hazards and risks to health or safety of that work
 - sufficiently describes measures to control those risks
 - describes the manner in which the risk-control measures are to be implemented.
84. Describing the control measures and how they will be implemented includes providing, where applicable, a description of the equipment used in the work, the qualifications of the people doing the work and the training required to do the work safely.
85. The statement is designed to be developed after or in conjunction with a risk assessment. The SWMS must then be completed before all reasonable risk-control measures are put into place and before work begins.
86. A SWMS may be recorded on a standardised form produced by an employer, a union or employer association, a government agency or other body.

Application of physical fall prevention

87. When work cannot be undertaken on the ground or from a solid construction, employers must ensure that physical fall prevention measures are used, so far as is reasonably practicable, for the protection of people undertaking any construction work where there is a risk that they may fall more than two metres.
88. Physical fall prevention includes the measures listed as level 2, 3, and 4 controls (see pages 17, 24 and 26). Preference needs to be given to controls at a higher level in the hierarchy.

Methods of controlling risks for work at heights above two metres

89. This section provides detailed guidance on practicable fall prevention measures for use in general construction. The guidance is set out in the order of the hierarchy of control measures described on page 8. Wherever it is reasonably practicable to do so, controls at the top of the hierarchy must be implemented before consideration is given to implementing lower order controls. In any case, the method selected needs to be appropriate for the particular task.

Level 1 controls

Work on the ground

90. Eliminating the need to work at height is the most effective way of protecting the safety of workers.
91. Designers and people with control of construction work need to consider how work can be done at ground level to eliminate the need for work at height.
92. Examples of elimination include:
 - prefabricating roofs at ground level
 - prefabricating wall frames horizontally, then standing them up
 - using precast or tilt-up concrete construction instead of concrete walls constructed in situ
 - using paint rollers with extendable handles
 - using remote release clutches for crane-lifted loads positioned at height.

Work from a solid construction

93. Careful and ongoing assessment of the physical location is needed to eliminate areas in which workers could fall, and many areas of a construction site can be turned into a solid construction area.
94. 'Solid construction' means an area that has:
 - a surface that is structurally capable of supporting people and material and any other loads applied to it
 - barriers around its perimeter and around all open penetrations from, or through, which workers could fall
 - an even and readily negotiable surface and gradient
 - a safe means of access and egress.

95. Solid construction must satisfy all of the following requirements:

Structural strength

96. Different types of work involve different loads on the supporting surface. Make sure that the surface and its supports can safely carry the expected loads – including workers, materials, tools and equipment. When in doubt, make sure a structural engineer determines the safe load capacity before use.

Surface and gradient

97. Surfaces need to be non-slip and free from trip hazards and penetrations. Smooth surface working areas should not be steeper than 7 degrees (1 in 8 gradient). Cleated or grated surfaces, which provide greater slip resistance, should not be steeper than 23 degrees (approximately 1 in 2.4 gradient).

Edge protection

98. Perimeter protection must be provided on the exposed edges of all work areas. These include:

- the perimeters of buildings or other structures
- the perimeters of skylights or other fragile roof materials
- openings in floor or roof structures.

Additional void protection

99. Where there is a risk that workers performing tasks from work platforms or ladders may fall over the guardrailing, precautions need to be taken to ensure that stairwells and other openings are covered. Coverings need to be secured in place to prevent dislodgment and be designed to withstand any loads that may be imposed during construction work or in the event of a fall (see Figure 5).

Access and egress

100. Every solid construction must have safe and suitable access and egress. Common means of access and egress include:

- existing floor levels
- permanently installed platforms, ramps, stairways and fixed ladders, provided they are suitable for the construction work being undertaken, and they comply with AS 1657 *Fixed platforms, walkways, stairways and ladders – Design, construction and installation*
- temporary access ways and temporary stair systems
- secured single portable ladders set up at a slope of between 4:1 and 6:1, and extending at least 900mm above the stepping-off point.

101. Ladder and stairway landings require the same level of edge protection adjacent to their open sides and ends as solid construction.

102. If possible, stepladders and trestle ladders should not be used for access to or egress from solid construction.

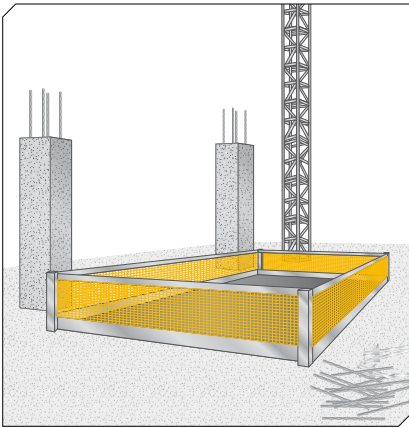


Figure 5: Guardrails protecting an open penetration through the slab.

Level 2 controls

Passive fall prevention devices

103. Passive fall prevention devices include roof safety mesh, guardrailing, perimeter screens and temporary work platforms.
104. A temporary work platform provides a working area for the duration of the job and is designed to prevent a person from falling. It encompasses a wide variety of plant and equipment, including scaffolds, elevating work platforms, mast climbing work platforms and work boxes.

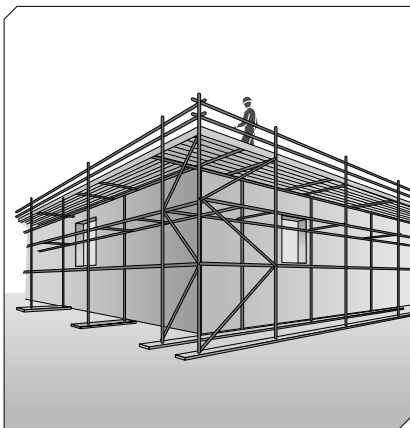


Figure 6: Perimeter scaffold with a fully decked working platform, guardrails and toeboards.

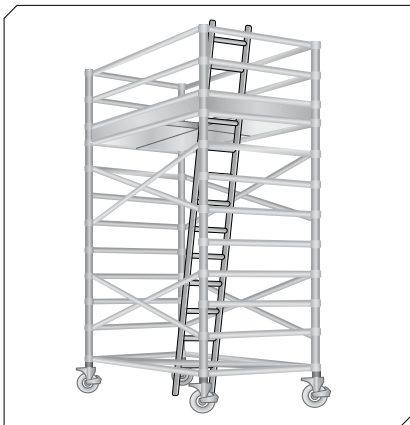


Figure 7: Mobile scaffold with an access ladder and a trapdoor to provide the largest possible hazard-free working platform.

Scaffolds

105. Scaffolds are a common means of providing a safe work platform for working at height. There is a wide variety of scaffolding systems available (see Figures 6 and 7).
106. Working platforms on scaffolds are generally rated as light, medium or heavy duty.

Light duty – up to 225kg per bay. This is suitable for plastering, painting, electrical work and other light tasks.

Medium duty – up to 450kg per bay. This is suitable for general trades work.

Heavy duty – up to 675kg per bay. This is required for bricklaying, concreting, demolition work and other tasks involving heavy loads or heavy impact forces.

Special duty – has a designated allowable load as designed.

107. These safe load limits include the weight of people (which is taken to be a nominal 80kg per person) plus the weight of any materials, tools and debris on the working platform. Therefore, a properly constructed mobile scaffold with a light duty platform can safely support one worker and 145kg of tools and materials, or two workers and 65kg of tools and materials.
108. All scaffolding must be erected, altered and dismantled by competent people. Any scaffold from which a person or object could fall more than four metres must be erected, altered and dismantled by, or under the direct supervision of, a licensed scaffolder.
109. Scaffolds need to comply with AS/NZS 4576 *Guidelines for scaffolding*, which provides practical guidance on training, safe work practices, inspection and use of scaffolding and scaffolding equipment.

Information, instruction and training for workers using scaffolds

110. Where work is performed from a scaffold, employers must ensure that workers understand:

- what loads the scaffold can safely take (such as how many bricks per bay)
- not to make any unauthorised alterations to the scaffold (such as removing guardrails, planks, ties, toeboards and braces)
- that working platforms need to be kept clear of debris and access obstructions along their length
- that incomplete or defective scaffolds must never be accessed.

111. Where work is performed using mobile scaffolds, workers need to understand that the scaffold:

- must remain level and plumb at all times
- be kept well clear of powerlines, open floor edges and penetrations
- never be accessed until the castors are locked to prevent movement
- never be moved while anyone is on it
- never be accessed from the outside – use internal ladders only.

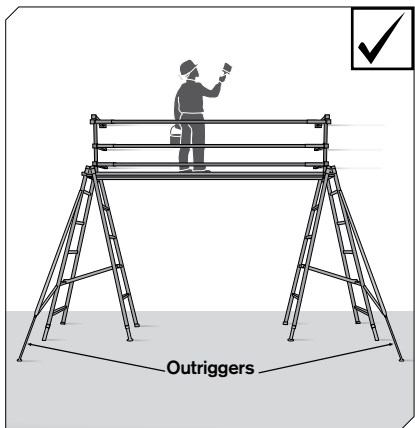


Figure 8: A correctly set-up trestle-ladder scaffold showing guardrailing and outriggers (toeboards not shown).

Trestle scaffolds

112. Trestle scaffolds may be used at heights greater than two metres only when guardrailing and toeboards are incorporated to prevent people and materials falling off the open side or end of the working platform. The system (including planks) needs to be assembled according to the manufacturers' specifications. Trestle scaffolds without guardrailing are only suitable for tasks requiring a working platform where the potential fall height does not exceed two metres.
113. Some trestle-ladder scaffolds include outriggers to increase stability (see Figure 8). Trestle-ladder scaffolds are only suited to light duty tasks, such as painting and rendering.
114. When adjusting the height of a trestle scaffold, make sure that only the purpose-designed pins are used. Do not use nails or pieces of reinforcing bar.
115. Work needs to be performed between the trestles. The working platform of a trestle scaffold needs to be a minimum of two planks or 450mm wide. The maximum spacing of trestles should not exceed the maximum recommended span of the scaffold planks. Since 1993, random length scaffold planks manufactured in accordance with AS 1577 *Scaffold planks* have this information marked on them. Where this information is not known, refer to the table below.

Maximum span of solid timber scaffold planks complying with AS 1577

Nominal thickness of plank (mm)	Maximum span (m)
38	1.5
50	2.0
63	2.5

116. Further guidance on the use of scaffolds is provided in AS/NZS 4576 *Guidelines for scaffolding*.



Figure 9: An example of a boom-type elevating work platform. The safety harness and lanyard assembly are not shown for purposes of clarity. The lanyard needs to be as short as possible and be attached directly to the designated anchor point – not to the handrail.



Figure 10: An example of a scissor-lift elevating work platform. As with boom-type platforms, people should not climb onto or off the platform when it is in an elevated position. A safety harness system is not required on this item of plant unless advised by the manufacturer or indicated in the risk assessment and a suitable anchor point is provided.

Elevating work platforms

117. Elevating work platforms are available in a wide variety of types and sizes. They include scissor lifts, cherry pickers, boom lifts and travel towers (see Figures 9 and 10). There are battery powered and internal combustion engine types. Some are designed for hard flat surfaces only, while others are designed for operation on rough terrain. Units powered by internal combustion engines are not suitable for use in buildings or areas with poor natural ventilation unless appropriate artificial ventilation is provided.
118. Elevating work platforms:
- need to be used on a solid level surface; the surface area needs to be checked to make sure that there are no penetrations or obstructions that could cause uncontrolled movement or overturning of the platform
 - may be used on other surfaces (when designed as 'rough terrain' units) in accordance with the manufacturer's directions; the surface area needs to be checked for unacceptable penetrations or obstructions
 - need to be clearly marked with the safe working load limit.
119. Operators working in travel towers or boom type elevating work platforms must wear an anchored safety harness. The harness system used must be able to arrest a fall before the user hits the ground.
120. People operating boom-type elevating work platforms with boom lengths exceeding 11 metres must have an appropriate licence.
121. It is a requirement that the design of an elevating work platform be registered with WorkSafe or with another state or territory workplace safety authority.
122. Further information on the safe use of elevating work platforms is provided in AS 2550.10 *Cranes, hoists and winches – Safe use – Mobile elevating work platforms*.

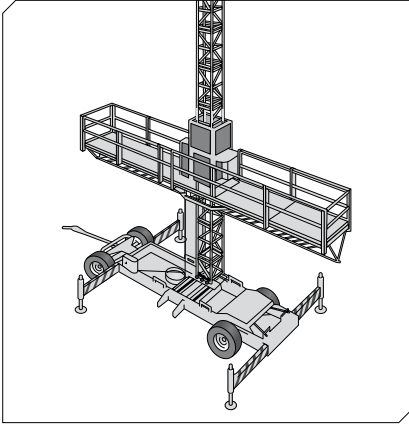


Figure 11: An example of a typical mast climbing work platform.

Mast climbing work platforms

123. Mast climbing work platforms are hoists with a working platform that is used to raise personnel and materials to a temporary working position. They use a drive system mounted on an extendable mast, which may be tied to a building (see Figure 11).
124. Mast climbing work platforms can be set up in either single-mast or multi-mast configurations. They are generally not suitable for use if the profile of a structure changes at different elevations (eg if the upper floors of a building 'step back' or balconies protrude from the building).
125. The erection and dismantling of mast climbing work platforms must be carried out, or be directly supervised, by a person holding an appropriate rigging or scaffolding licence.
126. It is a requirement that the design of a mast climbing work platform be registered with WorkSafe or another state or territory workplace safety authority
127. Further information on the safe use of mast climbing work platforms is provided in AS 2550.16 *Cranes – Safe use – Mast climbing work platforms*.



Figure 12: An example of a crane-suspended work box.

Work boxes

128. Work boxes are personnel-carrying devices designed to be suspended from a crane for the purpose of providing an elevated working area. They consist of a platform surrounded by an edge protection system, and need to be designed in accordance with AS 1418.17 *Cranes – Design and construction of workboxes* (see Figure 12).
129. Other types of temporary work platforms need to be used instead of work boxes if reasonably practicable.
130. It is a requirement that the design of a work box intended to be suspended from a crane is registered with WorkSafe or another state or territory workplace safety authority.
131. For further information and specifications for the use of crane-suspended work boxes, refer to AS 2550.1 *Cranes, hoists and winches – Safe use – General requirements*.

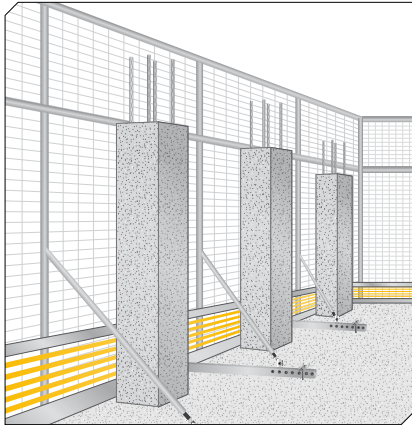


Figure 13: An example of a perimeter screen secured by props.

Perimeter protection

Perimeter screens

132. Perimeter screens that are purpose-designed for a building provide a high level of protection in preventing construction workers and any debris, tools or building material from falling from the building (see Figure 13).
133. Some screens incorporate prefabricated formwork to enable the casting of perimeter edge beams or stop ends for the edge of the floor. They may also be designed to cover two or more floors, with trailing screens to protect construction workers on lower levels while they are stripping the formwork and installing back propping.
134. Perimeter screens normally extend one floor above the floor they are supported from. The top of the screen needs to be high enough to provide perimeter protection for the floor that is to be built before anyone has to access this floor or its formwork deck. The framework supporting the screen needs to be able to bear the load of the screen. The mesh needs to be of minimum gauge 2.5mm, and have a maximum mesh opening size of:
 - 25mm nominal where no lining is used, or
 - 50mm nominal where lining is used.
135. Perimeter screens need to be designed by an engineer and fitted by licensed riggers in accordance with the design engineer's requirements. Gaps between screens and between the screens and the structure should not exceed 25mm.

Perimeter guardrails

136. Guardrails may be used to provide effective fall prevention at:
 - the edges of roofs and roof framing
 - the edges of scaffolds
 - the edges of work platforms, suspended slabs, formwork and falsework, walkways, stairways, ramps and landings
 - the perimeters of buildings and other structures
 - the perimeters of skylights and other fragile roof material
 - openings in floor and roof structures
 - the edges of shafts, pits and other excavations.
137. Before a guardrail system is adopted, the employer needs to ensure it will be adequate for the potential loads. The required load resistance will depend on the momentum of a falling person. For example, the momentum of a person falling from a pitched roof will increase as the pitch (or angle) of the roof increases. See Appendix J for information on guardrailing the edges of roofs.
138. Proprietary systems need to be configured, installed, used and dismantled by a competent person in accordance with the manufacturer's instructions.

Guardrailing the edges of roofs

139. Guardrailing may be used as fall prevention around the edge of a roof as a proprietary designed system or through incorporation into scaffolding. Figure 14(a-g) shows common examples of acceptable roof guardrailing arrangements on scaffolding.
140. Guardrails need to comply with AS 1657 *Fixed platforms, walkways, stairways and ladders – Design, construction and installation* and/or AS/NZS 4576 *Guidelines for scaffolding*.
141. Further information on guardrails for roofs can be found in AS/NZS 4994 *Temporary roof edge protection for housing and residential buildings*.
142. Where the slope of the roof exceeds 35 degrees, the roof is an inappropriate surface to stand on. Perimeter guardrails and catch platforms are inappropriate measures to protect workers on a steeply sloping roof.
143. In these circumstances, roof workers need a system to prevent sliding and to prevent falls from the perimeter, comprising one or more of the following:
 - aerial access equipment, such as an elevating work platform
 - a work positioning system, such as a travel restraint or industrial rope access system
 - a scaffold platform, located at the roof edge
 - a roof ladder.
144. Proprietary systems need to be configured, installed, used and dismantled in accordance with the manufacturer's instructions.

Barriers to restrict access

145. Barriers need to be used to cordon off elevated areas including roofs and balconies where edge protection is not provided and access is not permitted. The barriers need to be secure and restrict access to authorised people only. Signage needs to be erected that warns against entry to those areas.
146. Where possible, barriers need to be placed at least two metres inside any unprotected edge or opening. They can include steel mesh panels, metal post and rails and metal posts with timber rail assemblies. They need to be highly visible and securely fixed to prevent displacement.

Safety mesh

147. Safety mesh is designed to prevent falls through a roof, which is one of the most common fall problems in the construction industry. If securely fixed, safety mesh provides fall protection for roof installers and offers long-term protection against falling for maintenance and repair workers.
148. Where new or existing safety mesh is to be used to control the risk of workers falling, the integrity of the mesh and its fixings needs to also be verified by a competent person prior to use.
149. Safety mesh does not control the risk of falling from the perimeter or through penetration hazards. Therefore, safety mesh always needs to be used with appropriate edge protection, guardrails or fall-arrest systems and devices. Used in conjunction with these control measures, safety mesh is the preferred system for protecting workers laying roof sheets from falling.
150. Appendix D provides further guidance on the installation of safety mesh.

Working at heights above two metres

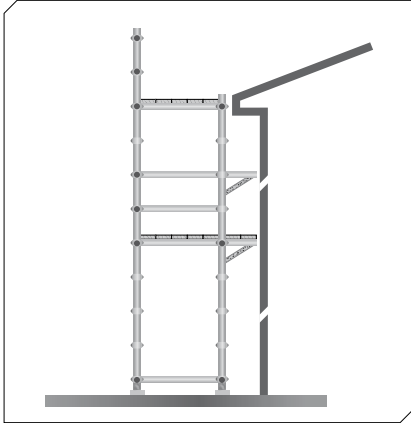


Figure 14(a): Scaffold platform at edge of roof with hop-up bracket for other trades.

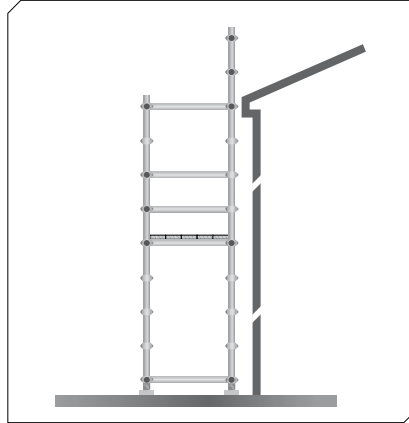


Figure 14(b): Inside standards supporting guardrails.

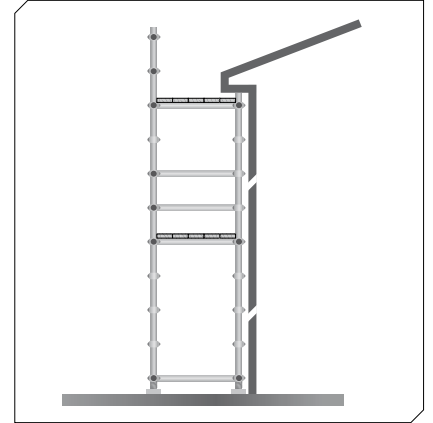


Figure 14(c): Scaffold platform below edge of roof.

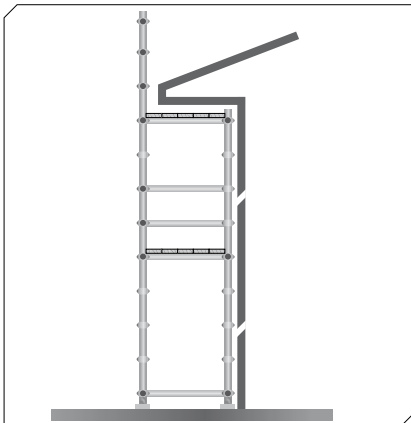


Figure 14(d): Outside standards supporting guardrailing.

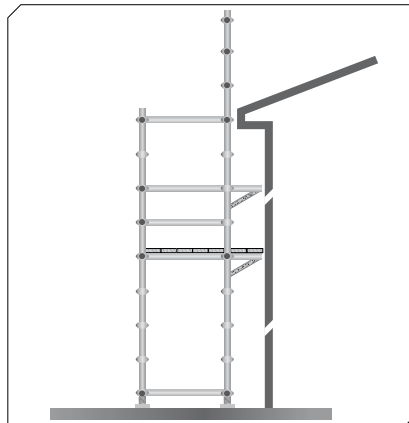


Figure 14(e): Inside standards supporting guardrailing with hop-up bracket for other trades.

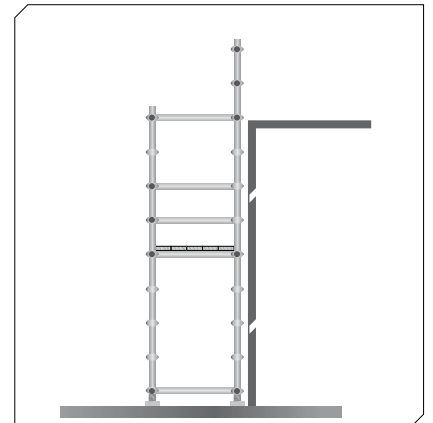


Figure 14(f): Inside standards supporting guardrailing adjacent to a flat roof structure.

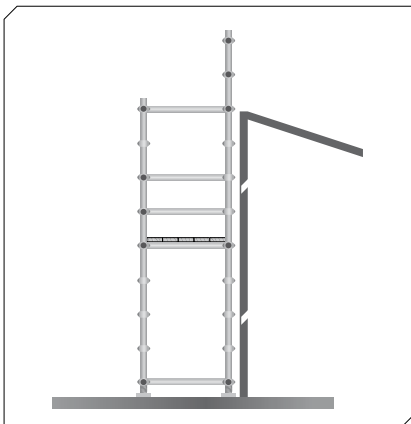


Figure 14(g): Inside standards supporting guardrailing adjacent to a roof structure that slopes away from the top edge.

Level 3 controls

Work positioning systems

151. A work positioning system is equipment that enables a person to be positioned and safely supported at a work location for the duration of the task being undertaken at height. Work positioning systems require a higher level of operator competency and supervision than control measures that are higher up in the control hierarchy (see page 8). Accordingly they should only be used where it is not reasonably practicable to use higher order controls.

Industrial rope access systems

152. Industrial rope access systems are used for gaining access to and working at elevated work areas, usually by means of vertically suspended ropes. Although fall arrest components are used in the industrial rope access system, the main purpose of the system is to gain access to a work area rather than to provide backup fall protection.
153. Other methods of accessing such work areas (eg elevating work platforms or building maintenance units) also need to be considered before implementing rope access systems, as a high level of skill is essential for their safe use.
154. Users, including supervisors, need to undertake a competency-based course of training such as those approved by the Australian Rope Access Association (ARAA).
155. For further guidance on industrial rope access systems, refer to:
- AS/NZS 4488.1 *Industrial rope access systems – Specifications*
 - AS/NZS 4488.2 *Industrial rope access systems – Selection, use and maintenance*
 - ARAA *Industry code* (September 2005 edition).

Travel restraint systems

156. A travel restraint system prevents the user from approaching an unprotected edge on a building or structure. Generally, the system consists of a safety belt or harness that is connected by a lanyard to a suitable anchorage point or static line. The system must be set up to prevent the wearer from reaching the edge.
157. Where a temporary roof anchor is used as an anchorage for a travel restraint system, it must be installed in accordance with the manufacturer's or designer's instructions.
158. The roof or other building component to which an anchor is to be attached must be checked by a competent person to verify that it is suitable for supporting the anchor.
159. It is preferable that travel restraint systems are used in conjunction with other fall prevention methods, such as guardrails, safety nets and catch platforms.
160. Travel restraint systems need to conform to the AS/NZS 1891 *Industrial fall-arrest systems and devices* series.

Travel restraint systems are not fall-arrest devices

161. Typical anchorage points for travel restraint systems are not designed for the impact of loads in the event of a fall. Therefore, where there is any possibility that a person using a travel-restraint device may approach an edge from where a fall is possible, a travel-restraint system should not be used (see Figure 15).

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

162. Although fall-arrest systems are not generally preferred (being low in the hierarchy of control measures), an individual fall-arrest system needs to be used instead of a travel-restraint system if any of the following situations apply:

- the user can reach a position where a fall is possible
- the user has a restraint line that can be adjusted in length so that a free fall position can be reached
- there is a danger the user may fall through the surface (eg fragile roofing material), or
- there is any other reasonably likely use or misuse of the system, which could lead to a free fall.

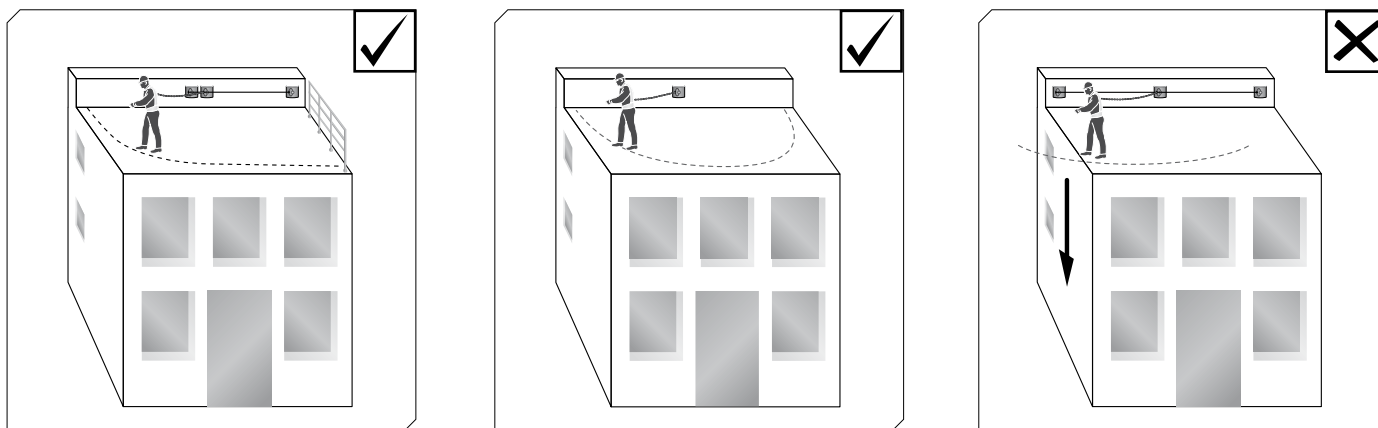


Figure 15: Travel restraint system options – right and wrong.

Level 4 controls

Fall-arrest systems

163. A fall-arrest system means equipment and/or material that is designed to arrest the fall of a person. Examples of fall-arrest systems include industrial safety nets, catch platforms and safety harness systems (other than a travel-restraint system).
164. Fall-arrest systems should only be used if it is not reasonably practicable to use higher level control measures of the types described on pages 15–25 (level 1, 2 and 3 controls) or if these higher level controls might not be fully effective in preventing a fall on their own.
165. Two examples of fall arrest systems are listed below.

Catch platforms

166. A catch platform is a temporary platform located below a work area designed to catch a falling person. The platform needs to be of robust construction and designed to withstand the maximum potential impact load. Scaffolding components may be used to construct fixed and mobile catch platforms.
167. Catch platforms need to:
- incorporate a fully planked-out deck
 - be positioned so its deck extends at least two metres beyond all unprotected edges of the work area, except where extended guardrailing is fitted to the catch platform
 - be positioned as close as possible to the underside of the work area (it is recommended that the distance a person could fall before landing on the catch platform should be no more than one metre)
 - always be used with an adequate form of edge protection.
168. Heavy-duty trestle scaffolds and split-head trestle scaffolds can provide simple and inexpensive catch platforms. The latter are particularly effective in openings and stairwells.

Safety harness fall-arrest systems

169. There are considerable hazards in using a safety harness fall-arrest system. Their use should only be considered where measures higher in the control hierarchy are not reasonably practicable.
170. A safety harness fall-arrest system should only be used where it is not reasonably practicable to use a fall-prevention measure, or where the fall prevention applied is not fully effective on its own. A safety harness fall-arrest system requires considerable skill to use safely, and in the event of an arrested fall, it is likely to cause some physical injury to the user. Where it is possible for a person to strike their head, a protective helmet needs to be provided and worn. For guidance on helmet selection, see AS 1800 *Occupational protective helmets – Selection, care and use*.

- 171. A safety harness fall-arrest system is intended to safely control a fall and reduce any impact. The system is an assembly of interconnected components, comprising a harness connected to an anchorage, either directly or by means of a lanyard. Safety harness fall-arrest systems can be used where workers are required to carry out their work near an unprotected edge.
- 172. Safety harness fall-arrest systems need to be evaluated to ensure not only that they will be effective, but also that no new hazards will be created by their use. Examples of possible new hazards include trip hazards and such severe restrictions on a person's movements that they cannot safely perform their work.
- 173. A person must not use a safety harness fall-arrest system unless there is at least one other person on the site who has been trained and can rescue them if they fall. In some situations, at least two people are required to safely rescue a person who has fallen.
- 174. Appendix G provides further guidance on safety harness fall-arrest systems.

Level 5 controls

Ladders

- 175. Ladders can be used when it is not reasonably practicable to use a higher order control measure.
- 176. Ladders need to be used primarily as a means of access to or egress from a work area.
- 177. They should only be used as a work platform if other methods of working at the required height are not reasonably practicable.

Selection of ladders

- 178. Ladders must be correctly selected for the task to be undertaken. The duration of the task, the physical surroundings of where the task is to be undertaken and the prevailing weather conditions must be taken into consideration. For example, metal ladders or metal-reinforced ladders should not be used for live electrical work.
- 179. Typically, construction work involves repetitive, high volume use and handling of ladders, requiring them to be of robust design and construction. Therefore, ladders used for construction work need to comply with the AS/NZS 1892 *Portable ladders* series. They also need to be industrial grade rather than domestic grade.
- 180. Fixed vertical ladders are generally not suitable for construction work.

Working at heights above two metres

Safe use of ladders

181. Any ladder used at a workplace must be used on a surface that is solid and stable, and set up so as to prevent the ladder from slipping.

182. Slipping of ladders can be prevented by:

- placing single and extension ladders at a slope of 4:1, and setting up stepladders in the fully opened position
- securing single and extension ladders at both the top and bottom (see Figure 16).

183. People using ladders should not:

- handle or use ladders where it is possible for the worker or the ladder to make contact with powerlines
- use metal or metal-reinforced ladders when working on live electrical installations
- set up the ladder in places, such as driveways and doorways, where a person or vehicle could hit it (if necessary, erect a barrier or lock the door shut)
- use a ladder near the edge of an open floor, penetration or on scaffolding to gain extra height
- over-reach (the worker's belt buckle needs to be within the ladder stiles throughout the work)
- use any power (air, hydraulic, electric or battery) equipment or tool specifically designed to be operated with two hands, such as concrete cutting saws and circular saws
- use tools that require a high degree of leverage type force (such as 'Stillsons' or pinch bars) which, if released, may cause the user to overbalance or fall from the ladder
- carry out work such as arc welding or oxy cutting
- work over other people
- allow anyone else to be on the ladder at the same time.

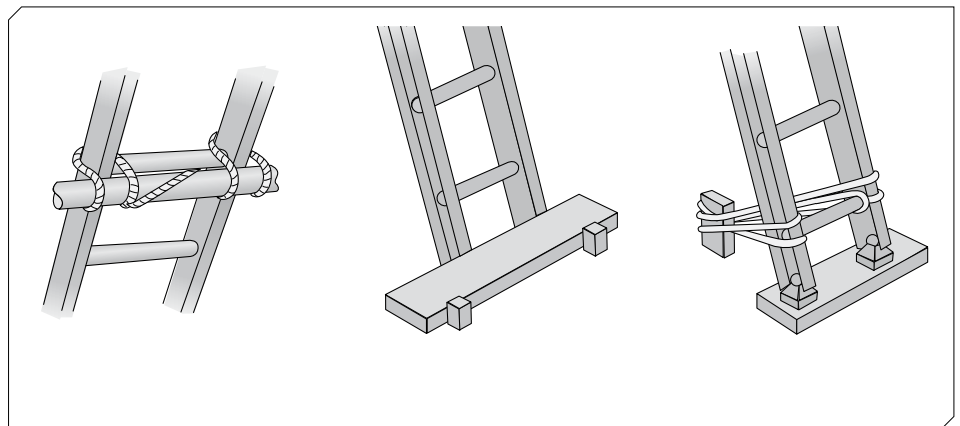


Figure 16: Some effective ways of securing a ladder.

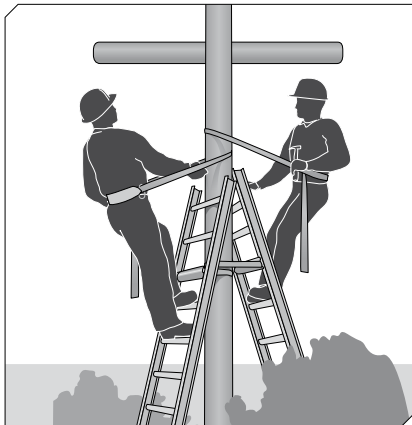


Figure 17: Pole straps used with portable ladders.

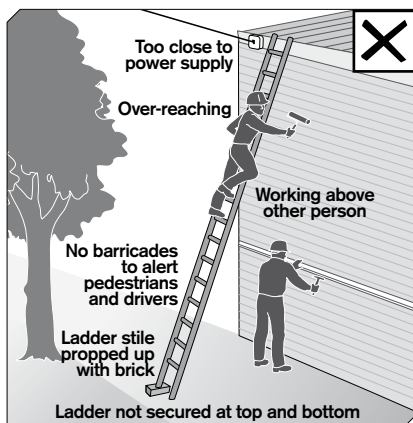


Figure 18: Unsafe ladder use.

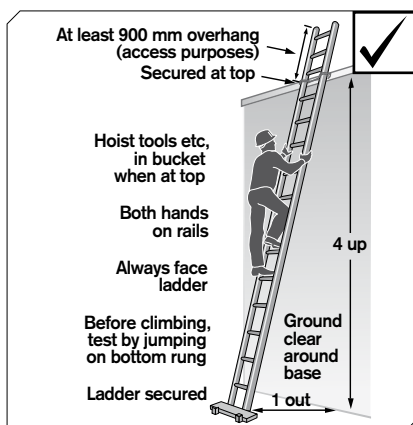


Figure 19: Acceptable ladder use.

184. Except where a pole strap (or similar device providing the user with full body support) is used (see Figure 17), any person using a ladder should not:

- face away from the ladder when going up or down, or when working from it
- stand on a rung closer than 900mm from the top of a single or extension ladder
- stand higher than the second tread below the top plate of any stepladder.

185. Where possible, ladders being used for access need to be set up at right angles to the working surface to allow workers to step off the ladder rather than having to step around or over the ladder (see Figures 18 and 19).

Ladder maintenance

186. Ladders need to be regularly inspected by a competent person. Ladders with any of the following faults need to be replaced or competently repaired:

- timber stiles that are warped, splintered, cracked or bruised
 - metal stiles that are twisted, bent, kinked, crushed or have cracked welds or damaged feet
 - rungs, steps, treads or top plates that are missing, worn, damaged or loose
 - tie rods that are missing, broken or loose
 - ropes, braces, or brackets that are missing, broken or worn
 - timber members that, apart from narrow identification bands, are covered with opaque paint or other treatment that could disguise faults in the timber.
- Note: This refers to the purchaser painting a ladder, not painting that is integral to the ladder's manufacturing process.

187. For further guidance, see the AS/NZS 1892 *Portable ladders* series, and AS/NZS 1657 *Fixed platforms, walkways, stairways and ladders – Design, construction and installation*.

Administrative controls

188. Administrative controls are systems of work or work procedures that help to reduce the exposure of employees to fall hazards where it is not reasonably practicable to use higher-level controls.

189. They may be used to support other control measures that are put in place. For example, work procedures may be needed to ensure the safe use of temporary work platforms, fall arrest systems and ladders. Administrative controls may also be needed to limit the time workers are exposed to a fall hazard and/or the number of workers involved in the task.

190. It is essential to involve contractors and other workers in the development of administrative controls. People who perform a task regularly often have a good understanding of the risks involved.

191. Administrative controls may include 'no-go' areas, permit systems, the sequencing of work and safe work procedures.



Figure 20: Example of signage for a 'no-go' area.

'No-go' areas

192. 'No-go' areas can be an effective method of making sure people are not exposed to fall hazards. They require adequate signage to warn against access to the hazardous area (see Figure 20). They can be used to highlight the risks of entry to an area where there is an unguarded fall hazard or to areas where work is being undertaken overhead and there is a risk of falling material.
193. Employers need to ensure that relevant information and instruction is provided to construction workers on the site about 'no-go' areas and that there is adequate supervision to ensure that no unauthorised worker enters the 'no-go' area.
194. For further guidance on safety signs, see AS 1319 *Safety signs for the occupational environment*.

Permit systems

195. Permit systems ensure that only competent people trained in the use of appropriate control measures work in an area where there is a fall hazard.
196. Examples include:
 - tagging all access points to a scaffold to prevent unauthorised access during erection and dismantling, with *'only licensed scaffolders permitted on an incomplete scaffold'* or similar wording
 - requiring permits for access to areas where travel restraint systems or fall-arrest systems are to be used.

Organising and sequencing of work

197. Make sure that the work is organised so that people do not increase the risk of a fall for themselves or others. For example, sequence jobs so that different trades are not working above or below each other at the same time. Plan the work so tasks are not performed for extended periods from a ladder or so that work at height is minimised in extremely hot or cold weather.

Safe work procedures

198. An administrative control may be as simple as a safe work procedure that describes in a safe work method statement the steps involved in safely undertaking a task. It may also include any particular training, instruction and supervision required.
199. A safe work procedure can be generic and applicable to a task that is routinely or repeatedly carried out.

Recording administrative controls

200. If administrative controls are to be used as the sole means of reducing the risk associated with a particular task, the employer must make sure a description of the task and the controls is recorded before the task is undertaken.
201. These records must be kept until the work covered by the administrative controls has been completed.
202. A single administrative control, such as a safe work procedure, may apply to a task that is repeatedly carried out in the same or similar circumstances at single or multiple workplaces.
203. However, the record needs to make it clear which particular task the administrative control applies to and the locations where the task is being undertaken.
204. If relying on administrative controls, it will be necessary to provide a high level of supervision to ensure that the safe work procedure is being followed. The procedures need be regularly reviewed to determine their effectiveness.

Trenching and excavation work

205. Excavation work can expose people to the risk of injury from a wide range of hazards. This section, however, focuses on trenching and excavation work that involves the risk of a fall from height and provides general guidance only.
206. Many incidents on construction sites have involved people, including young children, sustaining serious injury from falls into open trenches and excavations. Even shallow excavations can be trip and fall hazards, although the likelihood of injury when a person falls increases with the depth of the trenching or excavation work.
207. For more information on risk assessment processes, control measures and instruction and training, see page 6.

Duties

208. As with any other work, employers engaged in trenching and excavation work must, so far as is reasonably practicable, provide and maintain a working environment that is safe and without risks to health.
209. Additionally, from 1 July 2008, employers must not perform construction work involving a trench or a shaft where the excavated depth is more than 1.5 metres unless:
- a safe work method statement has been prepared before the work commences
 - the work is performed in accordance with that statement.
210. See page 14 for further information about safe work method statements.
211. Where there is a risk of any person falling a distance greater than two metres into a trench, shaft or other excavation, the employer undertaking the work must ensure that physical fall prevention measures are provided, so far as is reasonably practicable. 'Physical fall prevention measures' are control measures at level 2, 3 or 4 of the control hierarchy.

Risk assessment

212. For any trenching or excavation work, a risk assessment needs to be conducted in order to effectively control the risks involved.
213. The risk assessment needs to take into account the security of the excavation, both during work and when left unattended. Consideration also needs to be given to factors such as:
- how long the excavation will be left open
 - who may gain access to the excavation (including pedestrians and children).

Trenching and excavation work

214. If the risk assessment is for construction work where there is a risk that someone could fall more than two metres, physical fall prevention must be provided, so far as is reasonably practicable.

Control measures

215. Control measures to prevent people being injured from a fall from height during the excavation work must be provided, and need be properly installed and maintained until the work is completed or until a further risk assessment identifies that there is no longer any risk of people falling into the excavation (see Figures 21, 22 and 23).
216. Some control measures that need to be considered include:
- the application of physical fall prevention measures
 - isolating the trench or excavation using perimeter fencing, barricades, physical barriers, screens, handrails and trench covers capable of preventing access or preventing a person from falling
 - pedestrian detours that need to be clearly defined and protected
 - establishing a safe entry point where workers need to enter a trench or excavation, that protects them from falling into the trench or excavation
 - the provision of a safe means of movement between different levels of the excavation
 - the use of intermediate platforms for deep excavation
 - backfilling the excavation as work progresses.
217. When short-term physical barriers, such as star pickets and parawebbing are used in trenching, they need to be placed at least two metres from the edge of the trench. They need to be highly visible and capable of remaining in place during adverse weather conditions. Safety tape is not an adequate physical barrier as it is hard to see in low light conditions and can be easily broken. Barriers should not be used as guardrails, unless they are specifically designed for the purpose.

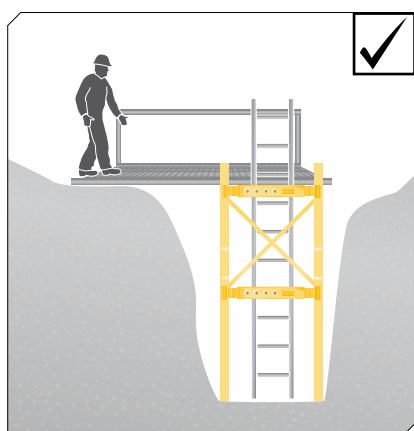


Figure 21: Example of a safe entry point for trenching.

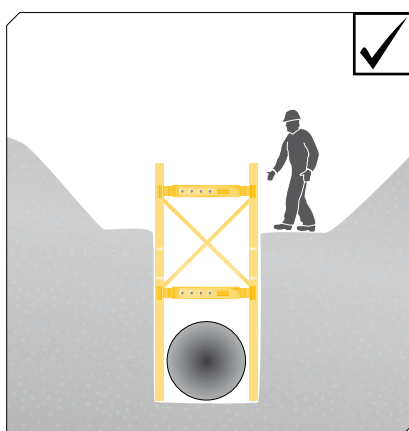


Figure 22: Example of a section of trench shoring extending above the excavation for fall protection.

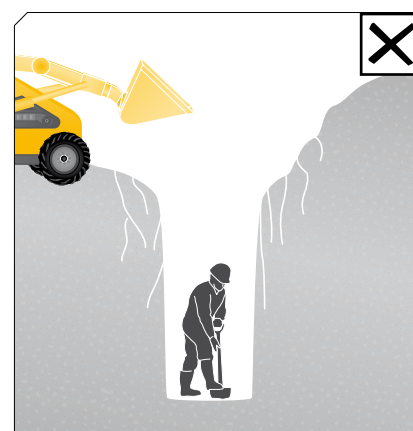


Figure 23: Example of an unguarded trench.

Appendices

Appendix A

The compliance framework

Appendix B

Consultation

Appendix C

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Appendix D

Installing safety mesh

Appendix E

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Appendix G

Safety harness fall-arrest systems

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Common fall hazards (things to consider)

Appendix I

Scaffolding (safety considerations)

Appendix J

Guardrailing (safety considerations)

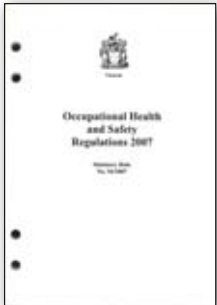
Appendix A – The compliance framework



Occupational Health and Safety Act 2004

Act No. 107/2004

The **Occupational Health and Safety Act 2004** (the OHS Act) sets out the key principles, duties and rights in relation to occupational health and safety (OHS).



Occupational Health and Safety Regulations 2007

Statutory Rule No. 54/2007

The **Occupational Health and Safety Regulations 2007** (the Regulations) specify the way in which a duty imposed by the OHS Act must be performed, or prescribe procedural or administrative matters to support the OHS Act (eg requiring licences for specific activities, the keeping of records or giving notice).



Compliance codes provide practical guidance to duty holders. If a person complies with a provision of a compliance code, they are deemed to comply with the OHS Act or Regulation duty covered by the code provision. However, compliance codes are not mandatory and a duty holder may choose to use some other way to achieve compliance.



WorkSafe Positions are guidelines made under section 12 of the OHS Act that state how WorkSafe will apply the OHS Act or Regulations or exercise discretion under a provision of the OHS Act or Regulations. WorkSafe Positions are intended to provide certainty to duty holders and other affected parties.



Non-statutory guidance includes information published by WorkSafe aimed at building people's knowledge and awareness of OHS issues, risks to health and safety and the disciplines and techniques that can be applied to manage and control risks. Non-statutory guidance is not mandatory, nor does it provide any 'deemed to comply' outcomes for duty holders. This guidance does, however, form part of the 'state of knowledge' about OHS.

Appendix B – Consultation

By law, employers must consult with employees on a range of matters that directly affect (or are likely to directly affect) their health and safety, so far as is reasonably practicable.

Consultation must involve sharing information with employees, giving the employees a reasonable opportunity to express their views and taking those views into account.

Where employees are represented by HSRs, these representatives must be involved in the consultation, so far as reasonably practicable.

The law sets out specific requirements on how HSRs are to be involved in consultation. These are as follows:

- Provide HSRs with all the information about the matter that the employer provides, or intends to provide, to employees. If it is reasonably practicable, the information must be provided to the HSRs a reasonable time before it is provided to employees.
- Invite the HSRs to meet with the employer to consult on the matter or meet with the HSRs at their request.
- Give the HSRs a reasonable opportunity to express their views on the matter and take those views into account.

The employer must include independent contractors and their employees in the consultation, so far as is reasonably practicable, if the employer has, or should have, control of a relevant matter that affects their health and safety.

Consultation is required when:

- identifying or assessing hazards or risks
- making decisions on how to control risks
- making decisions about the adequacy of facilities for employee welfare (such as dining facilities, change rooms, toilets or first aid)
- making decisions about procedures to:
 - resolve health and safety issues
 - consult with employees on health and safety
 - monitor employee health and workplace conditions
 - provide information and training
- determining the membership of any health and safety committee in the workplace
- proposing changes that may affect employee health and safety, such as changes to:
 - the workplace
 - plant, substances or other things used in the workplace
 - the work performed at the workplace
- doing any other thing prescribed by the Regulations.

In practice, this means that when planning to implement measures identified in this compliance code, or when making decisions to implement alternative measures to those specified in this compliance code, consultation must take place.

Appendix C – Safe work method statement

This safe work method statement (SWMS) is a site-specific statement that must be prepared before any high-risk construction work is undertaken.

[illegible]

Appendix C – Safe work method statement (continued)

Steps for filling out

Discuss with relevant employees, contractors and HSRs what work will be high risk, the tasks and associated hazards, risks and controls.

In the 'What are the tasks involved?' column, list the work tasks in sequence to how they will be carried out.

In the 'What are the hazards and risks?' column, list the hazards and risks for each work task.

In the 'How will the hazards and risks be controlled?' column, select the hazard or risk and then work through the control levels 1–4 from top to bottom. Choose a control measure (and how it is to be used) that is as close to level 1 as is reasonably practicable.

Control levels

1. **Eliminate** any risk to health or safety associated with construction work.
2. **Reduce** the risk to health or safety by any one or any combination of the following:
 - **Substituting** a new activity, procedure, plant, process or substance
 - **Isolating** people from the hazard, such as barricading, fencing or guardrailing, or
 - **Using engineering controls**, such as mechanical or electrical devices.
3. **Use administrative controls**, such as changing the way the work is done.
4. **Provide appropriate personal protective equipment.**

Brief each team member on this SWMS before commencing work. Ensure each team member knows that work is to stop immediately if the SWMS is not being followed.

Observe work being carried out. If controls are not adequate, stop the work, review the SWMS, adjust as required and re-brief the team.

Retain this SWMS for the duration of the high-risk construction work.

Appendix D – Installing safety mesh

Safety mesh

Safety mesh is the preferred system for protecting construction workers against falling through the roof while they are laying roof sheets.

Safety mesh is designed to prevent falls through the interiors of roofs. If securely fixed, it provides fall prevention not only for roof installers but for maintenance and repair workers.

Safety mesh does not prevent falls from the edge of a roof or through unmeshed holes in a roof, so it needs to always be used in conjunction with appropriate edge protection such as guardrailing or, where passive fall prevention devices are not reasonably practicable, safety harness systems.

Safety mesh needs to comply with AS/NZS 4389 *Safety mesh*, which specifies the minimum requirements for the design, construction, testing and installation of safety mesh for use in domestic, commercial and industrial building applications.

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

Installing safety mesh

People installing safety mesh should only use mesh where the necessary information has been made available by the manufacturer/supplier, including evidence of compliance with AS 4389 *Safety mesh*. Particular care is required to ensure that the mesh is securely connected to the structure and the overlap between adjacent sections of mesh is sufficient to generate the necessary strength to resist the force of a person falling onto it.

The method of installation must be safe. Use scaffolding or elevating work platforms to protect workers installing the mesh.

The safety mesh needs to be covered by the roof cladding as soon as possible after it has been installed. However, the people installing the cladding must ensure that this does not happen until such time as the mesh has been formally inspected and confirmed as being installed in accordance with the manufacturer's instructions.

Figure 24 shows one satisfactory method for installing safety mesh. The mesh is first cut to the right length from the roll and is then run out over the roof using a continuous rope system. Installers should not walk across the open purlins to draw the mesh.

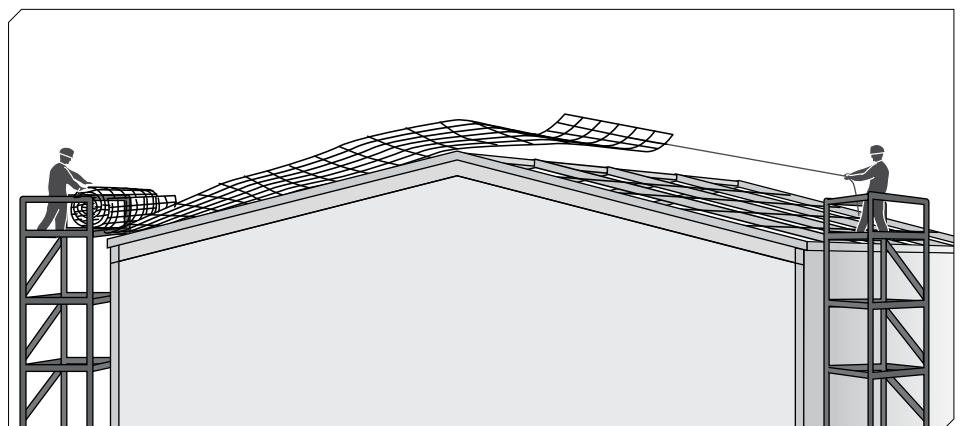


Figure 24: Mesh can be installed safely from scaffolding positioned at each end of the roof.

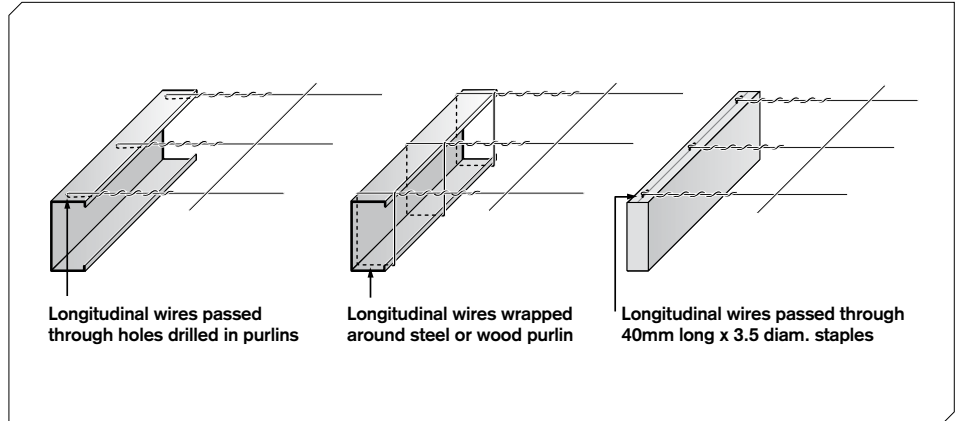


Figure 25: Means of fixing wire mesh to purlins, tied off with at least four full turns around the wire.
Note: Where a lap occurs, both wires are to be fixed, not just one wire.

The mesh needs to be fixed to the purlins by passing each longitudinal wire through a hole drilled in the top of the purlin and tied off with at least four full turns around the wire. If the mesh is being fixed to timber purlins, 40mm x 3.5mm staples need to be used (see Figure 25).

Joining of wires in the safety mesh

Adjacent runs of mesh should be side lapped by 150mm (one opening width). If the purlin spacing exceeds 1.7 metres, intermediate fixing with 2mm staples needs to be provided every second square, as shown in Figure 26. This intermediate stapling of the mesh needs to be carried out from underneath the mesh, by people using suitable fall prevention measures.

If it is necessary to join two lengths of mesh at their ends, the join needs to be across the full width of the mesh, with every longitudinal wire being joined. The knot and tie need to be the full length of the tail wire, which needs to be 300mm long. This tail wire needs to be tied at least three times around the knot, and the other tail wire placed under the longitudinal wire and tied around the transverse wire (see Figure 27).

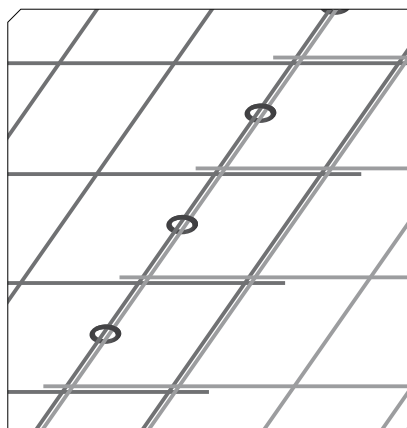


Figure 26: Overlapping of adjacent runs of mesh by one opening width. Steel staples are required to fix runs of mesh where purlin spacing exceeds 1.7 metres.

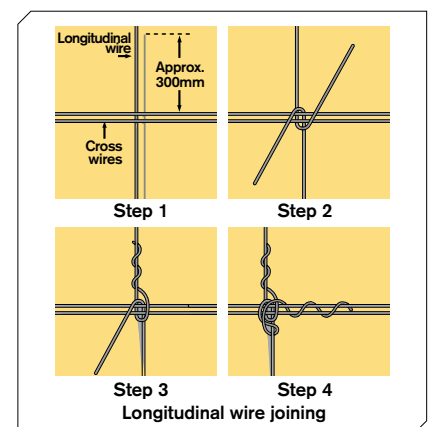


Figure 27: Method for joining longitudinal wires and cross wires (steps 1 to 4).

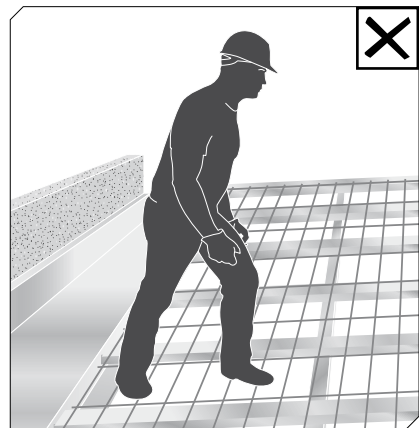
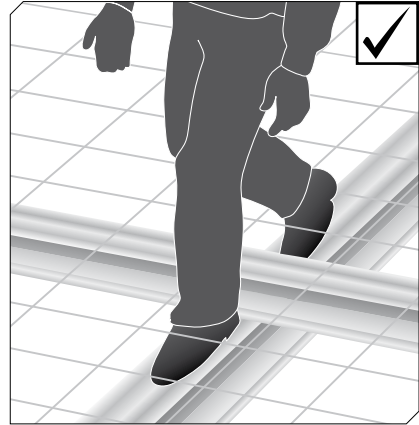
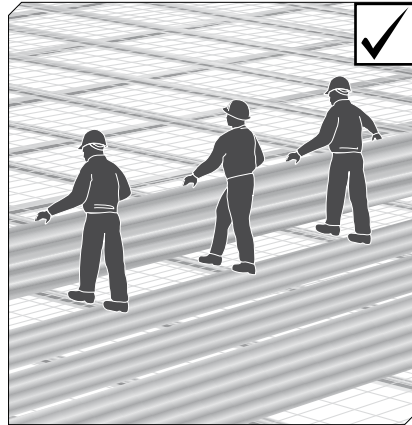


Figure 28: Walking alongside and on a meshed roof – good and bad examples.

The entire area of the roof frame needs to be meshed and the mesh then formally inspected to confirm that it has been installed in accordance with the manufacturer's instructions, before the roof is loaded with any bundles of sheeting.

Safety mesh is not a working platform in its own right, and people should not walk on it where it spans between purlins. Where it is necessary to stand or walk on purlins, this should only be done once the mesh has been installed and inspected (see Figure 28).

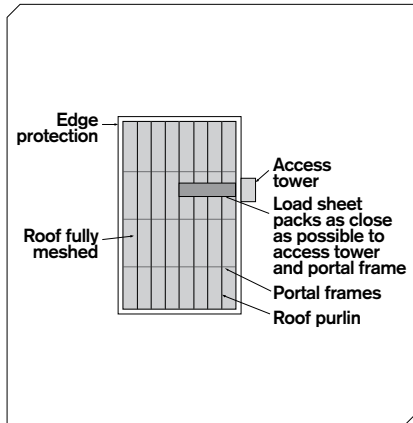


Figure 29: Positioning of the first pack of sheets in proximity to the access tower.

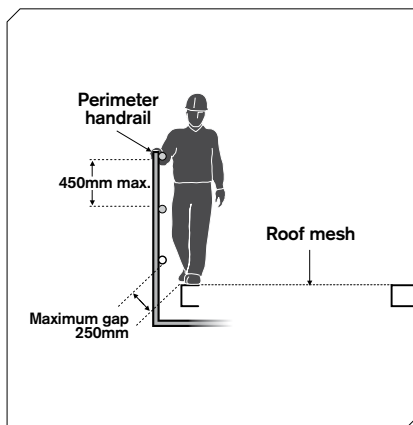


Figure 30: Using the eave purlin for access between packs of sheets (perimeter toeboard not shown for clarity).

Appendix E – Roof work

Roof laying

This appendix provides guidance on the laying of metal deck and similar roofing. Subject to a site-specific risk assessment, roof sheets can be installed on a portal frame structure as follows:

1. Install the roof mesh and guardrails as described in Appendix E. If any areas of the roof, such as box gutters, are not provided with mesh, other means of fall prevention need to be installed.
2. Install an access tower to provide a safe means of access to, and egress from, the roof area. The access tower needs to be located as close as possible to the load position for the first pack of sheets (see Figure 29).
3. Load the first pack of sheets as close as possible to the access tower. If the crane operator needs help on the ridgeline in order to control the swing of the load, access may be gained to the ridgeline by walking up the main rafter of the portal frame. This may occur only after the roof mesh has been installed. Never gain access across the roof by 'purlin hopping' from one purlin to the next.
4. Load each subsequent pack of sheets as close as possible to a portal frame. Where the pitch of the roof is not greater than 15 degrees, access between packs of sheets may be provided along the eave purlin using the guardrail as a support to maintain balance (see Figure 30). The eave purlin is not to be used for general access around the roof.
5. Roof sheets need to be laid out and fixed consecutively to provide a progressive working platform for the roof workers. To accommodate the laying of insulation, a gap may need to be left between roof sheets. Where, in order to complete the roof-fixing procedure, workers are required to cross this gap by stepping onto the purlin, the spacing between sheets needs to be minimised.

Perimeter guardrails

The installation of guardrailing needs to include the following:

- toeboards or mesh infill to prevent tools, materials and debris falling from the roof, unless a 'no-go' zone is established below the area where roofing works are being carried out and the slope of the roof is less than 15 degrees
- an additional mid-rail to ensure the nominal clear distance between rails does not exceed 450mm
- a third rail where there is no toeboard or in-fill panel.

Roof access

The means provided for roof workers to move to and from the actual work area must be safe, so far as is reasonably practicable.

In determining the suitability of access and egress, the tools and equipment roof workers may be required to carry to and from the work area needs to be taken into account. For example, where workers need to hand-carry tools or materials up to the work area, ladder access is not suitable, whereas stair access may be suitable.

A temporary stair access tower needs to be provided for new roof installations and for extensive repairs to, or replacement of, existing roofs where the eave-height above the ground exceeds six metres. Where the eave-height of such works exceeds 15 metres, a personnel and materials hoist needs to be installed in addition to a stair or ladder access tower which can be used for evacuation in case of a failure of the hoist.

Where permanently installed access and egress is used, it needs to comply with *AS 1657 Fixed platforms, walkways, stairways and ladders – Design, construction and installation*.

Where portable ladders are used for access, ensure that:

- the ladder is secured against displacement at the top and are provided with non-slip feet
- the ladder is pitched at a vertical-to-horizontal slope of not less than 4:1 and not more than 6:1
- workers using the ladder have a safe place to stand when alighting from it
- the stiles of the ladder extend at least 900mm above the stepping-off point
- metal or wire bound ladders are not used in the vicinity of powerlines.

Fragile and brittle roofs

Roofs need be assumed to be covered with a brittle or fragile material unless they are specifically identified as metal and in sound condition. Brittle or fragile roofing material can include roofing made of asbestos cement roof sheets, cellulose cement roof sheets, glass, fibreglass, acrylic or other similar synthetic moulded or fabricated material used to sheath a roof or contained in a roof.

Where a roof or part of a roof covering comprises fragile or brittle material, warning signs need to be displayed at all points of access to any work area where fragile material is present and are securely fixed in positions where they will be clearly visible to people accessing the work area.

Where it is necessary for work to be carried out on a roof containing fragile materials, the employer needs to ensure that the underside of the roof is inspected to determine the extent of fragile roof material, the existence of any safety mesh and the structural soundness of the roof and any safety mesh and its fixings.

To enable work to be carried out safely on or adjacent to any part of a roof sheathed in brittle material, the employer needs to ensure that:

- temporary walkways at least 450mm wide are provided, with edge protection, as a means of access to and egress from any work area where permanent walkways are not provided
- where the slope of the roof exceeds 1:6, cleats need be fixed to the top side of the walkway planks, and the walkway need to be adequately secured
- temporary roof ladders are provided if the roof is steep (ie in excess of 35 degrees); these need to be used in conjunction with a fall-arrest system.

Roof work checklist

1. Is there safe access to roof areas?

Where there is no permanent access to roof areas, provide properly constructed temporary access. Portable industrial-grade ladders with a load rating of at least 120kg, secured against movement, pitched at about 75 degrees (4:1) and extending at least 900mm above the stepping-off point may be suitable for minor work. For major roofing work, provide a scaffold stairway access tower. Never allow workers to use barrow hoists to gain access to the roof.

2. Have existing roofs been thoroughly checked?

Before commencing work on an existing roof, make sure it has been thoroughly inspected to determine its strength. Check the condition of roof trusses, rafters, purlins and roof battens. Identify all areas of fragile roofing, such as cement sheeting and fibreglass skylights. Check the fixing and strength of safety mesh, paying particular attention to any signs of heavy corrosion. Strengthen any suspect areas of roof support with temporary props or similar.

3. Are workers protected from falling off roof edges?

A fall from height is the most serious risk associated with roof work. Where a scaffold has been provided for the construction of the walls or guttering, leave it in place until the roof work is complete. Where this is not possible, use a temporary guardrailing system. There are proprietary guardrailing systems available that are suitable for a wide range of roofing situations. For the rare occasions when guardrailing is not reasonably practicable, consider using other measures such as safety line systems, including travel restraint systems and fall-arrest systems. Make sure that any safety line system is securely anchored and is set up so that inertia reel lines or other types of lanyards cannot be severed on sharp edges. Also make sure that the lines can be used without creating the 'pendulum effect' in the event of a worker falling.

4. Are workers protected from falling from incomplete roofs?

For metal deck roofing, the best way to protect roof workers from falling over leading edges is to cover the entire roof area with safety mesh before the roof is laid. This also provides ongoing protection for future roof maintenance and repair work. Where roofs are being constructed or re-roofed in distinct stages, barriers or travel-restraint lines need to be fixed in order to physically separate roof workers from areas not yet meshed.

5. Are workers protected from falling through skylights and penetrations?

Skylights that are not protected with safety mesh and penetrations left for the installation of air-conditioning can be a danger to roof workers. Securely cover them or fix temporary guardrailing around them.

6. Are people protected from the dangers of falling material?

Isolate the area below roof work wherever there is any danger of people being struck by falling material, debris or tools. Also isolate areas under roof edges unless toeboards are fixed to temporary guardrailing to contain all material, debris and loose tools.

7. Do roof workers have appropriate footwear?

Roof workers need protective footwear that gives them a non-slip and flexible grip on the roof surface.

8. Is electrical supply available at roof level?

A readily accessible electrical power supply is needed for most forms of roof work. Satellite power boards need to be installed at roof level. Where this is not reasonably practicable, measures must be taken to ensure extension leads can be safely lowered to a power board and are protected from mechanical damage.

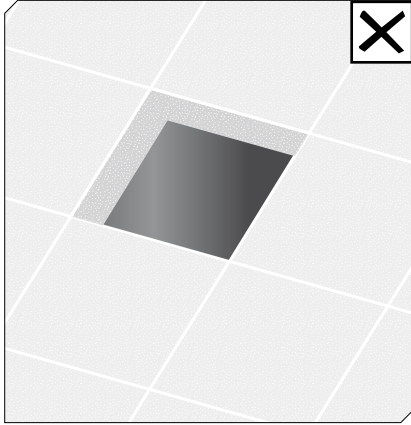


Figure 31: Unprotected holes are a severe hazard and need to be covered.

Appendix F – Guarding of holes and openings

Holes, penetrations and openings in roofs and other structures need to be made safe immediately after they are formed.

Holes or openings in concrete floors need to be, where reasonably practicable, guarded with embedded wire mesh and covered with material that is strong enough to prevent objects or people falling through.

Holes or openings in any other type of (non-concrete) floor need to be covered with material that is strong enough to prevent objects or people falling through and need to be securely fixed to the floor.

Holes or openings covered with wire mesh should not be used as a work platform.

When installing services, only the part of the wire mesh that allows access for installation needs to be removed, and the cover needs to be modified to fit around the installed service.

All covers need to be securely fixed and marked clearly with the words 'Danger – Hole Beneath' (see Figures 31, 32 and 33).

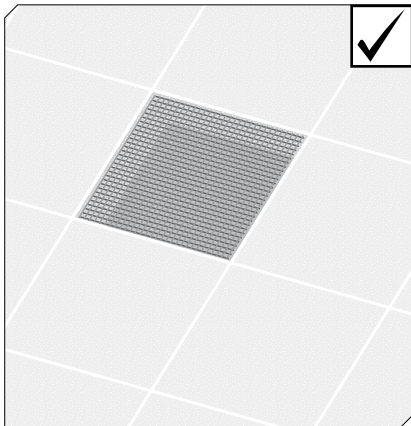


Figure 32: 4mm mesh embedded in the concrete floor. The hole also needs to be covered to prevent things falling through.



Figure 33: Example of the type of danger sign to be affixed to the hole cover.

Appendix G – Safety harness fall-arrest systems

Safety harness systems can be used to arrest falls where workers are required to carry out their work near an unprotected edge. However, they can only be used as the primary means of risk control if it is not reasonably practicable to use measures higher in the control hierarchy.

Safety harnesses and lanyards can also be used as travel-restraint systems to prevent workers moving from safe to unsafe areas on roofs.

Preparation

Compliance with published technical standards

Safety harness fall arrest systems need to comply with the AS/NZS 1891 *Industrial fall-arrest systems and devices* series.

Provide adequate training

Employers must ensure that any worker required to use a safety harness fall-arrest system is properly trained in its use.

Installation and use

Limit free fall distance

Safety harness fall-arrest systems, incorporating a lanyard, need to be installed so that the maximum distance a person would free fall before the fall-arrest system takes effect is two metres. There needs to be sufficient distance between the work surface and any surface below to enable the system, including the action of any shock-absorber, to fully deploy. Personal energy absorbers complying with AS/NZS 1891.1 *Industrial fall-arrest systems and devices – Harnesses and ancillary equipment* need to be used in conjunction with the lanyard.

Lanyards should not be used in conjunction with inertia reels as this can result in an excessive amount of free fall before the fall is arrested.

Note: Figure 34 is only illustrative of cumulative fall distances in safety harness systems. The left-hand drawing is not intended to show a recommended work practice.

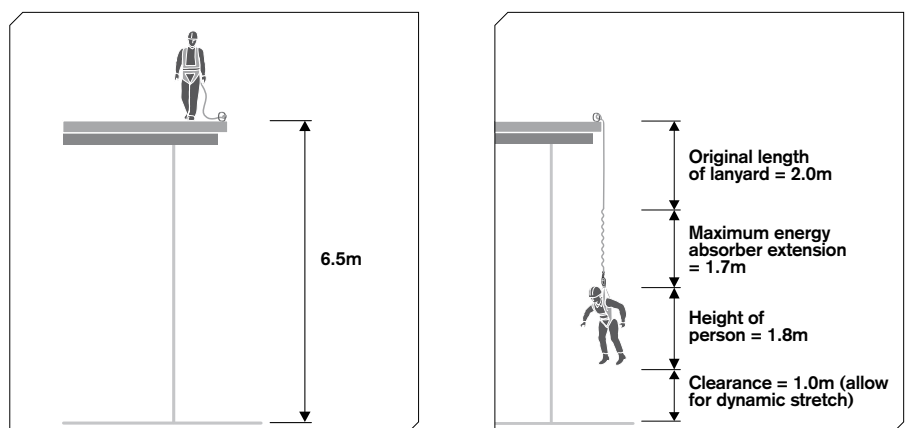


Figure 34: The required minimum fall clearance below the level of the line anchorage. The total fall distance before this particular configuration would be effective in arresting a fall is 6.5m.

Use full body fall-arrest harnesses

Full body fall-arrest harnesses need to be worn. Waist-type belts should not be used as injuries can result when the wearer's fall is arrested. The harness connection point to the fall-arrest line needs to be made at the top dorsal position. An alternative attachment position is when a line and rope-grab device is used on steeply sloping roofs and the user needs to manually operate the device by having the device in front. In these circumstances, the user can make the connection on to a front connection point, as recommended by the manufacturer.

Maintain minimum of slack in fall arrest line

There needs to be a minimum of slack in the fall-arrest line between the user and the attachment. The anchorage point should be as high as the equipment permits. Never 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 arrest line snagging on obstructions.

Use inertia reels correctly

When considering the use of inertia reels, bear in mind that they might not be effective in certain situations. For example, if a worker falls down the inclined surface of a steeply pitched roof, the inertia reel line may keep extending from the reel – it may not lock.

Inertia reels should not be used as working supports by locking the system and allowing it to support the user during normal work. They are not designed for continuous support.

Vertical and self-retracting anchorage lines can be used as a risk-control measure in connection with work performed from boatswains' chairs and ladders. Where such lines are used, no more than one person should be attached to any one line.

Use compatible components

Fall-arrest systems and safety harnesses should only be used with the individual manufacturer's components that are known to be compatible. The use of non-compatible components may lead to 'roll-out' with some hook/karabiner configurations, and could result in a user being injured or killed. The hazard cannot always be avoided by using components produced by the same manufacturer under the one brand name. If unsure whether components of a fall-arrest system are compatible, contact the manufacturer for further information.

Snap hooks need to be of the double action type, requiring at least two consecutive deliberate actions to open. Snap hooks should not be connected to each other as this could prevent the safe operation of the snap hook (eg roll-out may occur). Some double action hooks are susceptible to roll-out. Screw gate karabiners or hex nut connectors may sometimes be appropriate. For further guidance, see *AS/NZS 1891.4 Industrial fall-arrest systems and devices – Selection, use and maintenance*.

Ensure prompt rescue in event of fall

It is imperative that the rescue of a worker who is suspended in a full body harness occurs promptly. Suspension trauma is a condition where a person suspended in a harness in a substantially upright position may experience blood pooling in the legs. Depending on the susceptibility of the individual, this may lead to loss of consciousness, renal failure and death.

To enable workers to be removed from the suspended position as quickly as possible, employers need to consider having a pre-rigged retrieval system in place and ensure that workers using safety harnesses do not work alone.

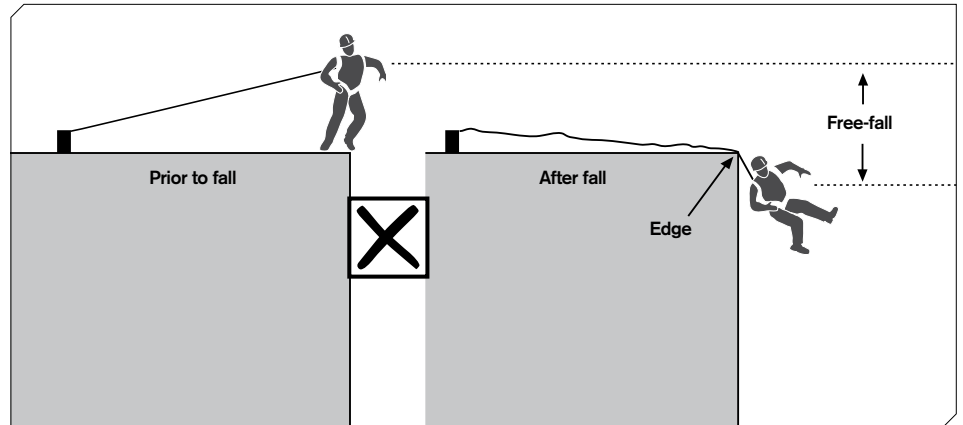


Figure 35: Incorrect set up of the fall-arrest line.

Damage to lines and lanyards

Preventing failure of the fall-arrest line

Safety harness fall-arrest systems can be used to arrest falls where workers are required to carry out their work near an unprotected edge. However, when fall-arrest anchorages are located lower than head-height or the system user is situated at a horizontal distance away from the anchorage, the fall-arrest line is likely to make abrupt contact with an edge if the worker falls through or from the perimeter of the structure, as in Figure 35. This could lead to failure of the fall-arrest line.

This also applies to lanyard systems. Precautions need be taken to ensure that the lanyard will not be damaged or fail if it comes into contact with any edge during a fall.

Damage or failure occurs because contact with an edge (such as a steel I-beam or brick parapet) reduces the breaking strength of the inertia reel line. In addition, the shock loading is transferred to the snagging point of the line and not to the internal energy absorber of the inertia reel.

In the event of a fall, the inertia reel line should not make contact with an obstruction or edge, unless the manufacturer can verify that such contact will not impair the safe use of the inertia reel. It is important that the verification applies to the specific type of edge involved in the work process.

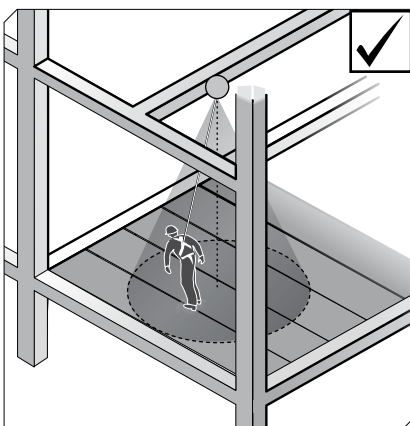


Figure 36: Working within an arc below the inertia reel.

Positioning the inertia reel anchor points

Inertia reels need to be anchored above head-height to prevent the line making contact with an obstruction and to limit the free fall distance to that recommended by the designer/manufacture. The user needs to work within an arc below the inertia reel, as illustrated in Figure 36.

Note: provision of an anchorage point above head height is difficult to achieve in demolition operations. Other control measures will therefore need to be provided.

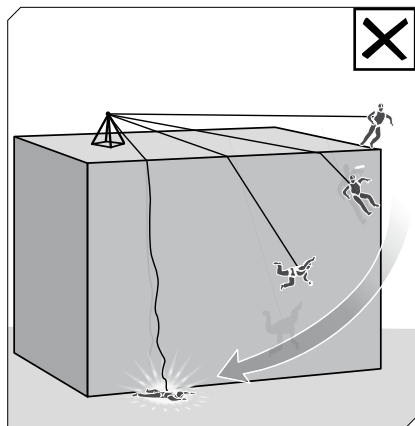


Figure 37: During 'swing down' the length of the lanyard and positioning of the anchor allow contact with the ground.

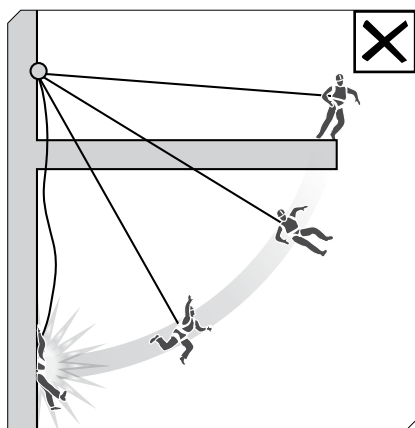


Figure 38: During 'swing back' the worker may hit the structure.

Hazards with safety harness fall-arrest systems

Pendulum effect

If a person using a safety harness fall-arrest system falls, the system may act as a pendulum, and in some situations the user may swing onto the ground ('swing down') or swing back onto the building or structure ('swing back').

Swing down

'Swing down' can occur if the fall-arrest line slides back along the perimeter edge of the roof until it is vertical. When this happens, the person may hit the ground, or the arrest line may break as a result of its contact with the edge of the roof (see Figure 37).

Measures to address the hazard of 'swing down' include:

- installing guardrails
- placing the anchorage point at a right angle to the position of the line at the perimeter edge (eg by using a mobile anchorage)
- installing a second anchorage point and belay devices (intermediate anchorages).

Swing back

With 'swing back', the user swings back into the building structure and collides with any obstructions on the path of this swing (see Figure 38).

If there is any risk of 'swing back', the use of a safety harness fall-arrest system would not be appropriate.

Inspection of safety harness fall-arrest systems

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

Inspection of anchorages

Employers need to ensure that a permanently fixed anchorage is inspected by a competent person, and it is regularly inspected at no less than six-month intervals if it is permanently fixed and in regular use.

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

When the competent person doing an inspection assesses the anchorage is impaired, the employer needs to ensure that:

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

All anchorages need to be visibly checked prior to use.

Inspections for faults and condition

Checklists for inspections to detect any equipment faults and assess the condition of fall-arrest belts, lanyards and harnesses can be found in the equipment manufacturer's documentation.

Inspections after a fall-arrest

A safety harness fall-arrest system that has arrested a fall needs to be checked by a competent person following the fall and not be used until it has been verified as being fully serviceable.

Appendix H – Common fall hazards (things to consider)

The following is a list of some of the more common issues that need to be taken into consideration when identifying fall hazards in the workplace.

Surfaces:

- The stability, fragility or brittleness.
- The ability to slip (eg where surfaces are wet, polished, glazed or oily in the case of new steelwork).
- The safe movement of workers where surfaces change.
- The strength or capacity to support loads.
- The slope of work surfaces.

Levels

- Where levels change and workers may be exposed to a fall from one level to another.

Structures

- The stability of temporary or permanent structures.

The ground

- The evenness and stability of the ground for the safe support of scaffolding or a work platform.

The working area

- Whether it is crowded or cluttered.

Scaffolding

- Check for platform fully decked, bracing, tying, guardrailing, access.

Edges

- Edge protection for open edges of floors, working platforms, walkways, walls or roofs.

Penetrations, openings and holes

- Will require guarding (similarly unguarded shafts and excavations).

Proximity of workers to unsafe areas

- Where loads are placed on elevated work areas.
- When objects are below a work area, such as reo bars and star pickets.
- Where work is to be carried out above workers (eg potential hazard from falling objects).
- Power lines near working areas.

Movement of plant or equipment

- Access to, egress from and movement around the working area (checking for obstructions).

Multiple contractors are working in the same area

Manual handling

- Checking safe work practices for carrying awkward material, such as plaster boards and roof sheeting, which may be caught by the wind.

Vision is impaired

- Vision impaired or restricted by the use of goggles, face shields, respirators or other devices or there is reflective glare off surfaces.

Lighting

- Needs to be adequate for the task.

Weather conditions

- When heavy rain, dew, extreme heat or cold or wind are present.

Footwear and clothing

- Suitable for the conditions.

Ladders

- Where and how they are being used.

Appendix I – Scaffolding (safety considerations)

Safety requirements and other considerations for scaffolds include:

- Scaffolding needs to conform to the AS/NZS 1576 *Scaffolding* series.
- Employers must ensure that all people required or permitted to erect, alter or dismantle scaffolding (regardless of its height or type) have received the information and instruction necessary for them to be able to perform the work safely.
- If a person or object could fall more than four metres from a scaffold, that scaffold must be erected, altered and dismantled by the holder of a licence for the appropriate class of scaffolding.
- A person must not alter scaffolding without authority from the employer who has control of the use of the scaffold.
- Scaffold platforms need to be a minimum of 450mm wide.
- Modular scaffolds need to be of the same type – not made up of mixed components. Mixed components from different manufacturers have resulted in scaffold incompatibilities and failures, posing significant risks to people using the scaffolding.
- Mobile tower-frame scaffolds can be used to provide safe working platforms.
- Brick guards or mesh panels need to be fitted to working platforms where bricks are being stacked and laid.
- The maximum load capacity of a scaffold must never be exceeded.
- A scaffold that is incomplete and left unattended needs to have danger tags and warning signs attached at particular locations to prevent use, and have access points to the incomplete scaffold blocked off.
- All long-term scaffolds, regardless of height, need to be checked regularly for structural integrity by a competent person (such as an engineer experienced in the design of temporary structures).
- Scaffolds exceeding four metres in height need to be inspected and tagged by a competent person (such as a licensed scaffolder) before use, after any alteration or repair, and at intervals of not more than 30 days.
- Additional inspections need to be carried out in certain circumstances, such as after a severe storm or earthquake.
- Safe access to and egress from the scaffold's working platforms must be provided.
- Edge protection (guardrails and toeboards) needs to be provided at every open edge of a scaffold working platform. Meshing needs to be installed over access and egress points.

Appendix J – Guardrailing (safety considerations)

The safety requirements for guardrailing include:

- Every open edge of a stair, landing, platform or shaft needs to be protected to prevent a person falling.
- The guardrail system needs to be constructed to withstand a force of 0.55kN (approximately equivalent to 55kg) applied at any point. Where edge protection is used on roofs with pitches exceeding 15 degrees from the horizontal, the edge protection needs to be able to withstand the added impact forces.
- Top-rails need to be between 900mm and 1100mm above the working surface.
- Mid-rails and toeboards need to be provided. However, wire mesh infill panels incorporating a toeboard may be used instead of the mid-rail.
- A bottom rail above the toeboard needs to be provided for more severe roof slopes. Both a mid-rail and infill mesh panel will assist in preventing people and objects from falling through.
- Guardrailing needs to comply with AS 1657 *Fixed platforms, walkways, stairways and ladders – Design, construction and installation*, AS/NZS 4576 *Guidelines for scaffolding*, or AS/NZS 4994 *Temporary roof edge protection for housing and residential buildings*.
- If access points are required for equipment (eg a hoist), they need to be protected with gates, safety chains or other means to prevent a person from falling through.
- Where guardrail systems are intended to be used in conjunction with steel structures or tilt-up construction, designers and builders need to plan for the guardrails and fixings to be attached to the panels prior to the structures being raised from the ground.

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