Boating Industry Association of New South Wales Ltd

DEVELOPING WORKPLACE HEALTH & SAFETY GUIDANCE

for the

RECREATIONAL & LIGHT COMMERCIAL BOATING INDUSTRIES

WHS GUIDANCE MATERIAL

SECTION 2

HEIGHT SAFETY

Prepared between January 2010 & October 2011 with the generous support & assistance of individuals and businesses within the membership of the Boating Industry Association of NSW (BIA).

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DISCLAIMER: This research was funded under the WorkCover Assist Program. The research conclusions are those of the authors and any views expressed are not necessarily those of WorkCover NSW or the Boating Industry Association of NSW.

Note: This material provides a brief overview of some of the key issues and readers are directed to the further guidance material provided and to seek expert advice as required. Each business should utilise risk management principles, including consulting relevant workers, to ensure any control measures implemented are properly tailored to the site, workers and tasks.

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Introduction

Achieving a safe site with safe work practices requires a business's ongoing commitment and action. It is process of continual improvement to adapt to changes in technologies, changes in plant and equipment, taking on new personnel, as well as to meet requirements under various health and safety regulations, codes of practice and Australian Standards.

Australia is moving towards a national model of managing health and safety at workplaces, and from 2012 it is planned that all states and territories will be adopting the new:

- Work Health and Safety Act
- Work Health and Safety Regulations and
- Codes of Practice.

These laws will replace the NSW Occupational Health and Safety Act (2000) and the NSW Occupational Health and Safety Regulation (2001)

The following guidance material has been prepared for BIA members to provide information on managing selected 'hazardous' issues in the industry:

- height safety
- undertaking hazardous manual tasks
- working in confined or enclosed spaces and
- moving boats.

In each section there is:

- an overview of the hazard
- an outline of the legal requirements for addressing each of the hazard areas
- case studies from BIA members illustrating how different businesses have tackled the hazards
- lists of other potential options that could also be considered for controlling risks
- references for where to look for further guidance and more technical information

This guidance is not 'prescriptive' but rather provides BIA members with suggestions and options from businesses that face similar health and safety challenges. It encourages the user to follow the risk management approach to identify hazards, assess the risks and to eliminate or otherwise control the risks so far as reasonably practicable. Under the WHS Act this means "*that which is, or was at a particular time, reasonably able to be done in relation to ensuring health and safety of workers, taking into account and weighing up all relevant matters including:*

> *(a) the likelihood of the hazard or the risk concerned occurring; and*
> *(b) the degree of harm that might result from the hazard or the risk; and*
> *(c) what the person concerned knows, or ought reasonably to know, about:*
>> *(i) the hazard or the risk; and*
>> *(ii) ways of eliminating or minimising the risk; and*
>
> *(d) the availability and suitability of ways to eliminate or minimise the risk; and*
> *(e) after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk*"

When undertaking risk assessments in the workplace it is a legislative requirement that consultation with workers is carried out as part of the process. By drawing on the experience, knowledge and ideas of the workers a business is more likely to identify all hazards in the workplace and choose effective control measures.

When implementing control measures within a workplace the Hierarchy of Control should be utilised. The Hierarchy of Control ranks the levels of control from the highest level of protection and reliability to the lowest level of protection and reliability.

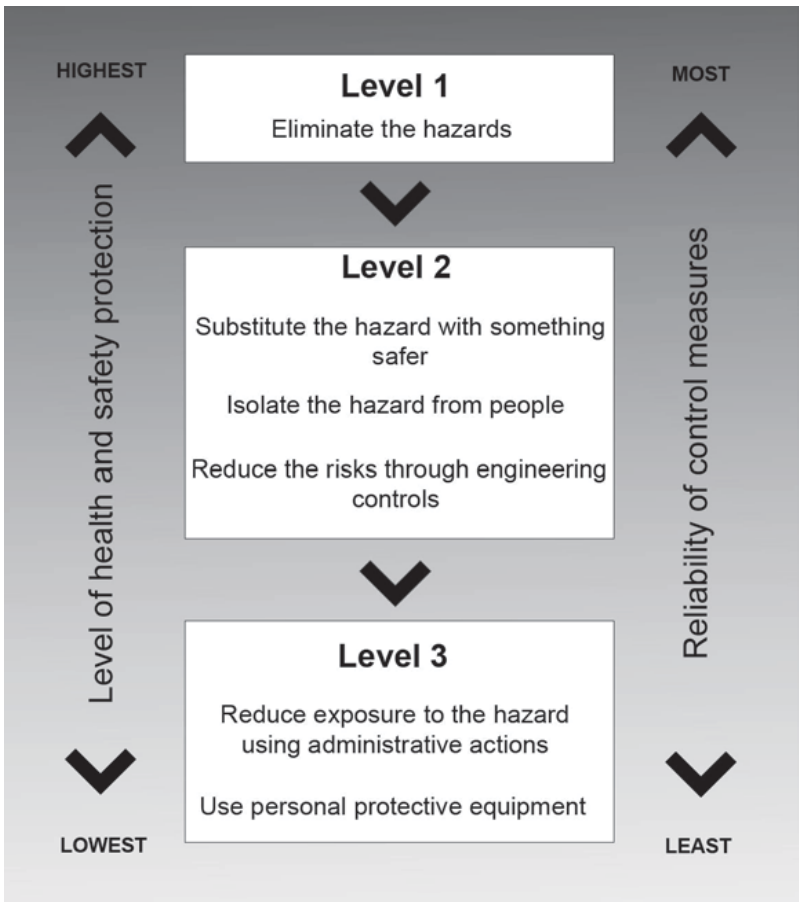

Diagram 1 - Hierarchy of Control (Model Code of Practice – How to Manage Work Health and Safety Risks)

Methods used by other businesses to eliminate or control risks may be easy to copy, or may need to be adapted to suit, or may not suit the conditions and personnel at other businesses. Regardless of which option is the best fit for individual businesses it is hoped that this guidance will assist BIA's members to review and upgrade their existing health and safety management and generate new ideas for managing hazards at work.

Further Guidance

Work Health and Safety Act 2011
Work Health and Safety Regulation, Safe Work Australia
Model Code of Practice – How to Manage Work Health and Safety Risks, Safe Work Australia

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WORK HEALTH AND SAFETY ISSUE – HEIGHT SAFETY

The problem

The risk of falls has been identified in the marine industry as a major contributor to serious injuries to workers. WorkCover NSW has nominated 'Falls from Heights' as one of the two key hazards for attention and action during 2011 (the other hazard being manual tasks).

The key fall hazards in the marine industry are when a person is working:

- on ***elevated structures*** such as on planks alongside the hull
- on ***ladders and other equipment*** to gain access to high parts of the vessel, such as flybridges
- near ***openings*** such as hatches and companionways
- at or near the ***edge*** of a deck or other structure
- on or near lightweight or ***fragile surfaces*** and
- on ***slippery, sloping or unstable surfaces***, including wet or polished surfaces.

The consequence

Injuries and incidents reported to WorkCover NSW by businesses in the recreational and light commercial boating sector over the past 5 years include the following examples:

- A worker fell 3m from a scaffold, injuring his back and a knee.
- A worker was climbing out of a boat 1 metre high and slipped, twisting his ankle.
- A worker fell through an open hatch, injuring his ribs
- A worker slipped off the deck of the boat when cleaning it

In some of the fall cases reported to WorkCover the workers required long periods off work, and often had limited mobility when they finally resumed work.

The law

The Work Health Safety legislation requires that the person conducting the business or undertaking must:

> Identify all hazards that could rise to the risk of falling in the business or undertaking so far as is reasonably foreseeable.
>
> Eliminate or control the risk of falls so far as is reasonably practicable.

In managing the risks of falls, the WHS Regulations require the following specific control measures to be implemented, where it is reasonably practicable to do so:

1. *Can the need to work at height be avoided to eliminate the risk of a fall?*
   - Carry out any work that involves the risk of a fall on the ground
2. *Can the fall be prevented by working on solid construction?*
   - A building or structure that is used as an existing place of work and includes safe access and egress from which there is no risk of a fall from one level to another, for example properly constructed stairs with fixed handrails, flat roofs with a parapet or permanently installed guard rails around the edges.

It is usually not necessary to implement additional control measures to manage the risk of falls for workplaces in buildings that already comply with the requirements of the National Construction Code of Australia, for example in relation to stairs, mezzanines and balconies.

3. *Can the risk of a fall be minimised by providing and maintaining a safe system of work, including:*

   - providing a fall prevention device (for example, installing guard rails) if it is reasonably practicable to do so, or
   - providing a work positioning system (for example, an industrial rope access system) if it is not reasonably practicable to provide a fall prevention device, or
   - providing a fall-arrest system, so far as is reasonably practicable, if it is not reasonably practicable to provide a fall prevention device or a work positioning system.

In some cases a combination of control measures may be necessary, for example using a safety harness while working from an elevating work platform.

Passive fall prevention devices include:

- temporary work platforms (such as scaffolding)
- elevating work platforms (such as scissor lifts and cherry pickers)
- work boxes
- platforms on trestle ladders
- systems such as perimeter guard rails, safety mesh etc.

Work positioning systems include:

- industrial rope access systems
- travel restraint systems

Fall arrest systems include:

- catch platforms
- industrial safety nets
- individual fall arrest systems (ie with personal harnesses)

The attached guidance notes provide descriptions of how to meet the height safety requirements that are listed above. The notes also provide real examples of how members of the NSW BIA have eliminated or controlled the risk of falls.

Does your business comply?

Check how well YOUR business is currently managing height safety by completing the attached *Height Safety - Self Assessment Tool*. Score yourself in each of the areas, and identify areas of non-compliance. This tool also outlines the elements of a good height safety system.

Use this first score as a baseline, and once you have looked over the guidance notes and the case studies you will see where your systems can be improved. By following the guidance you will achieve better height safety for all people on your site, and better compliance with the work, health and safety laws.

The guidance material

Use the guidance material to assist you to follow the risk management approach to identify hazards at your workplace, assess the risks, and either eliminate or control the risks. The guidance follows the required 'hierarchical' approach to managing risk, and often the 'control' will require a combination of these measures.

What the law requires:	Guidance material to help you comply:
Can the work that may involve a risk of a fall be carried out on the ***ground or on a solid construction***;	HS 01 - Working from a solid construction
Can the risk of a fall be minimised by using a ***passive fall prevention device***;	HS 02 - Fabricated platforms and scaffolds HS 03 - Elevating work platforms and work boxes
Can the risk of a fall be minimised using a ***work positioning system***;	HS 04 – Using Harnesses
Can the risk of a fall be minimised using ***a fall arrest system***;	
For access and egress and for light work of short duration ladders may be used	HS 05 - Using ladders

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Height Safety
Self Assessment Tool

Key steps to a safe system:	Hazard Identification	Risk Assessment	Risk Control	Consultation	Documentation	Instruction & Training	Supervision
NON-COMPLIANCE	No intentional identification of potential fall hazards	No assessments of fall hazards have been done	No attempt has been made to eliminate or reduce risks from falls	No evidence of management consulting with workers	No documents outlining any of the steps taken towards identifying, assessing and managing the risk of falls	No evidence of workers having received training and instruction in height safety or falls prevention	Workers are left unsupervised with no agreed or stated safe work methods for work undertaken at heights
WORKING TOWARDS COMPLIANCE	Some fall hazards have been identified with or without incidents or injuries occurring	Assessments have been done on an ad hoc basis and/or are incomplete	Some controls have been put in place, but these do not follow the 'hierarchy' and/or are incomplete	Consultation is on an ad hoc basis, and/or workers' feedback and views are not taken into account	Some documentation of some steps in the risk management of this hazard	Some training has been provided in some aspects of height safety or falls prevention	Safe Work Methods have been stated and/or provided but no effort to ensure workers' compliance
COMPLIANCE	Proactive fall hazard identification is done regularly	Assessments are done regularly and show consideration of risk factors	Height safety guidelines have been followed, with the most appropriate fall prevention measures in place	Workers are consulted on a routine basis regarding height safety and methods to prevent falls	Documents outlining the decisions and their rationale for managing height safety at the business, with Safe Work Method Statements provided	Workers are trained in the safe use of fall prevention and height safety equipment and/or methods, and safe work methods	Supervision ensures the Safe Work Methods are followed and any problems are acted on

Based on the WorkCover NSW BackWatch Scoreboard, 1998

Height Safety – Self Assessment Tool V2

WORK HEALTH AND SAFETY INDUSTRY GUIDANCE

HEIGHT SAFETY – Working from a 'solid construction'

HAZARDOUS TASKS identified

Serious injuries can result from falls from relatively low levels. For this reason the law requires that wherever possible people ***avoid*** working at heights (eliminate the risk).

Where work can't be undertaken on the ground, the next step is to consider if the work can be undertaken from a 'solid construction'.

Do you have work areas that you consider provide a 'solid construction' to work from? Solid constructions *may* include working on the deck of a boat or a mezzanine storage area but there are a number of factors to assess to determine if the work area meets the requirements under the new Code of Practice* for being a 'solid construction.'

Consultation is a legal requirement and an essential part of managing health and safety risks.

A safe workplace is more easily achieved when everyone involved in the work communicates with each other to identify hazards and risks, talks about any health and safety concerns and works together to find solutions. This includes cooperation between the people who manage or control the work and those who carry out the work or who are affected by the work. By drawing on the knowledge and experience of your workers, more informed decisions can be made about how the work should be carried out safely.

RISKS to assess

To determine if you have suitable 'solid constructions' you need to check the following:

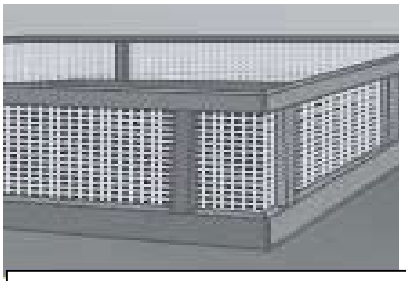
Structural strength

- Is the construction strong enough to carry the expected loads (eg workers, materials, tools and equipment)?

Edge protection

- Does it have guard rails or other structural components - 900 mm and 1100 mm above the working surface - that prevents a persons or objects falling over the edge?
- Do guard rails have mid rails and toe boards or wire mesh infill panels?

A guard rail with a mid rail and toe-board



A guard rail with wire mesh panels

HS – 01 Working from a solid construction V3

Protection of openings and holes (such as hatches or other voids)

- Are there suitable covers that are securely fixed; or
- Are openings otherwise fenced off or guarded?

Surface and gradient

- Are surfaces non-slip and free from trip hazards?
- Does any slope not exceed 7 degrees or 1 in 8 gradient?
- Are cleated surfaces (which provide greater slip-resistance) no steeper than 20 degrees (1 in 3 gradient).

Entry and exit

Does the construction have suitable access, such as:

- Permanently installed platforms, ramps, stairways and fixed ladders? Or
- Temporary access ways and temporary stair systems? Or
- Secured single portable ladders (set up at a slope of 4:1 and extending at least 1m above the stepping off point)
- Consideration for environmental factors including rain, strong wind, and lighting

RISK CONTROL options

1. Change the task so that some can be done at ground level

The best control is always to eliminate the hazard, and in this case this means re-designing tasks to allow all or part of them to be undertaken at ground level.

Consider if any of the following can be applied at your business to reduce the need to work at heights:

- Prefabricating boat parts at ground level
- Removing boat parts for repairs and working on them at ground level
- Cleaning boats when they are still in the water – such as in the travel-lift bay – rather than on the hardstand or slipway (depending on environmental issues)
- Reducing shelving heights so that workers can access items from ground level
- Using tools with extendable handles where possible (eg paint rollers etc)

Any reduction in the need for workers to use ladders and other elevated platforms will have an impact on reducing risk.

2. Conduct the work on/from a solid construction

When the work can't be done at ground level, the next best option is to work from or on a 'solid construction'. These 'constructions' must meet the criteria as listed above under the heading 'RISKS to assess'.

Do safety lines on yachts provide adequate 'edge protection'?

'Safety lines' are common around the perimeter of yacht decks to reduce the risk of crew washing overboard and into water. Lines are often at a height of between approximately 700 - 850mm or mid thigh height, and with a mid line, and a 'toeboard' style edge may or may not be present at the gunwale.

These 'safety lines' generally do ***not*** meet the strict criteria for providing 'edge protection', and the consequence of a fall onto a hardstand or slipway is much more serious than a fall into water.

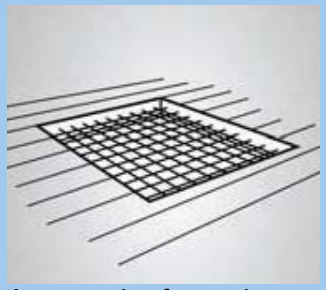
To achieve a safer system as well as being compliant with the Regulation and Code, it's recommended that you consider controls such as using:

- a temporary platform with guard rails by the side of the vessel
- a clip-on temporary guard railing to achieve the required height and strength
- personal fall arrest or travel restraint systems (see Guidance – Using harnesses) or
- other means of catching someone should they fall (eg catch platforms, nets etc).

Avoiding falls through hatchways

Injury data for the boating industry shows that falls through hatches and companionways are common. Consider how you can reduce this risk at your workplace.

Fall hazard



An example of a mesh cover

Suggestions for reducing risk include:

- Requiring all hatches are left in the closed position unless actively in use
- Where hatches are not yet built or supplied, use temporary covers
- Where hatches are open for ventilation purposes, consider use of temporary mesh coverings (such as those used in the roofing industry)
- If space permits, use physical barriers around the opening
- Where temporary covers cannot be used, at minimum use visual aids/warnings

Your system for reducing risk may include a written document outlining your company's policy and the recommended controls for different scenarios, based on their risks. Risk would be affected by factors including the number and size of hatches, the number of people working on the deck, tasks undertaken near the hatches, the condition and angle of the deck, and other barriers or equipment on the deck etc. Workers need to be advised about any system to manage risk, supervised, and the policy enforced to aid compliance.

Further guidance

- Work Health and Safety Regulation
- Code of Practice – How to prevent falls at workplaces, Safework Australia
- Australian Standard 1657:1992, Fixed platforms, walkways, stairways and ladders – Design, construction and installation
- Australian and New Zealand Standard 4994.1:2009 – Temporary Edge Protection – General Requirements
- Australian and New Zealand Standard 4994.3:2010 Temporary edge protection - Installation and dismantling for edges other than roof edges
- Australian and New Zealand Standard 1891.1:2007 Industrial fall-arrest systems and devices - Harnesses and ancillary equipment
- Australian and New Zealand Standard 1891.2:2001 Industrial fall-arrest systems and devices - Horizontal lifeline and rail systems
- Australian and New Zealand Standard 1891.3:1997 Industrial fall-arrest systems and devices - Fall-arrest devices
- Australian and New Zealand Standard 1891.4:2009 Industrial fall-arrest systems and devices - Selection, use and maintenance

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WORK HEALTH AND SAFETY INDUSTRY GUIDANCE

HEIGHT SAFETY – Fabricated Platforms & Scaffolds

HAZARDOUS TASKS identified

Many tasks undertaken by marine businesses require working at heights to reach the hull and topsides of vessels. Much of this work is done on temporary elevated work platforms when the vessels are on slipways or on various exposed or covered hardstand areas.

> *"Temporary work platforms include scaffolds, elevating work platforms, mast climbers, work boxes, building maintenance units, portable or mobile fabricated platforms or any other platform that provides a working area and is designed to prevent a fall."*
>
> *Code of Practice – Managing the risk of falls at workplaces*

Depending on the vessel's size, hull shape and/or keel design, workers may be doing these tasks at significant heights, and this exposes workers to fall hazards, especially if the work platforms are not up to standard. How well do your temporary work platforms rate? Do they suitably manage the risks?

Consultation is a legal requirement and an essential part of managing health and safety risks.

A safe workplace is more easily achieved when everyone involved in the work communicates with each other to identify hazards and risks, talks about any health and safety concerns and works together to find solutions. This includes cooperation between the people who manage or control the work and those who carry out the work or who are affected by the work. By drawing on the knowledge and experience of your workers, more informed decisions can be made about how the work should be carried out safely.

RISKS to assess

When assessing the risks arising from using scaffold and other temporary elevated work structures the following factors should be considered:

- the slope and condition of the ground surface including for stability, support and slippage
- the weight and ease of assembly of the scaffold components, ladders and other equipment
- the adequacy of inspection and maintenance of each of the components of the elevated work area
- the safe working load of the structure

RISK CONTROL options

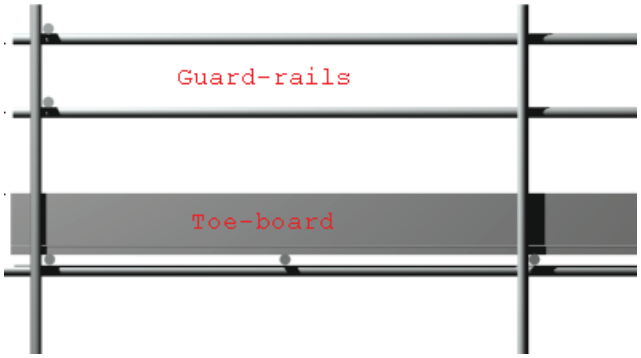
Mobile fabricated platforms

Many marine businesses make their own custom-designed work platforms, using a range of materials. These systems must meet the requirements under the Code of Practice and the relevant Standards.

Some of the key features of the requirements for platforms are:

- Guard rails at between 900 – 1100mm above the working surface
- Mid rails
- Toe boards (if > 2metres)

See illustration below:



- Height of top rail between 900 – 1100mm above working surface
- Maximum of 450mm between all rails
- Must have toe-board or wire mesh infill if > 2metres

Refer to the guidance list for further details.

Examples of work platforms utilising edge protection systems:

Scaffold systems

There are a number of scaffold systems available from heavy industrial to light weight 'Quick-Scaf'. Each system is suited to particular applications, so you need to determine the systems best suited to your worksite and your tasks.

Safety considerations include:

- Scaffolding conforms to AS/NZS 4576 *Guidelines for scaffolding* and the AS/NZS 1576 *Scaffolding* series
- All scaffolding is erected, altered and dismantled by competent persons
- 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
- Prefabricated scaffolds are of the same type and not mixed components, unless the mixing of components has been approved by the manufacturer
- Safe access to and egress from the scaffold is provided, and

- Edge protection (hand rails, mid-rails and toe boards) is provided at every open edge of a work platform.

Examples of scaffold and trestles that can be used in marine facilities

 Mobile scaffold with lockable wheels, platform >450mm wide, kickboard, bracing and internal access. (Image from Renthire.com)	  - Trestle and plank system. Both trestle and planks are stamped with safe working load rated

Training requirements

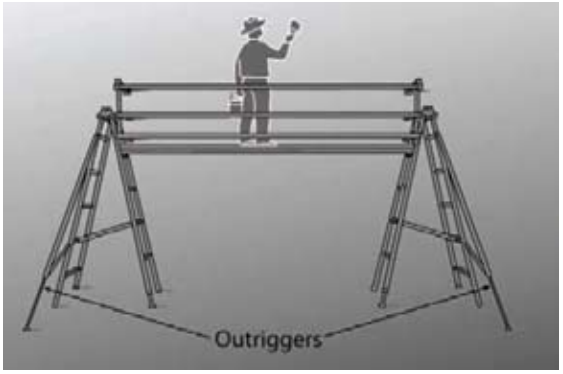
Where work is performed from a scaffold, you must ensure that the relevant workers understand:

- what loads the scaffold can safely take
- not to make any unauthorised alterations to the scaffold (such as removing guard rails, planks, ties, toe boards and braces)
- that working platforms need to be kept clear of debris and obstructions along their length, and
- that incomplete or defective scaffolds must never be accessed.

Platforms supported by trestle ladders

When trestle systems are used, the Code of Practice requires:

- If used at heights over 2 metres – have guard rails, midrails and toeboards
- Width of the working platform - not less than 450 mm
- Work area - only performed between the trestles
- Tasks - only suited to light duty tasks such as painting
- Components are 'rated' and this is clearly stated on the ladders



Trestle ladder scaffold with guard rails and outriggers for stability

For working over a height of 2 metres the Code recommends safer alternatives to trestle ladders, and these include: small scissor lifts, light duty aluminum mobile scaffolds, boom lifts and modular scaffolding. It's also important to ensure suitable access to the platform, with suitable steps up and easy transfer from the ladder to the platform.

Case study – Special brackets improve guard rail

One marine service routinely installs fittings on new racing yachts. They found that the standard scaffold could not be erected close enough to the hulls of the yachts due to their long keels and the hull shape.

To manage the problem the manager now uses trestle ladders with special brackets to attach guard rails securely to the trestles. These new brackets have been designed and constructed by a competent person and approved for use on the trestles. They have also found that the alloy planks and components are lighter and easier to manage than their earlier timber planks

Further guidance

- Work Health and Safety Regulation
- Code of Practice – Managing the risk of falls at workplaces, Safe Work Australia
- Australian and New Zealand Standard 4576: 1995 - Guidelines for scaffolding
- Australian and New Zealand Standard 1576 - Scaffolding series
- Australian and New Zealand Standard 1577: 1993 - Scaffold Planks
- Australian and New Zealand Standard 1892.1: 1996 - Portable Ladders – Metal
- Australian and New Zealand Standard 1892.3: 1996- Portable Ladders – Reinforced Plastic
- Australian and New Zealand Standard 4994.1: 2009 – Temporary Edge Protection – Part 1: General Requirements
- Australian and New Zealand Standard 4994.3: 2010 – Temporary Edge Protection – Part 3: Installation and dismantling for edges other then roof edges

WorkCover NSW:

- Collapse Of Scaffolding Safety Alert
- Scaffold perimeter edge protection general residential construction
- Erection platforms - for erecting, altering and dismantling of prefabricated steel modular scaffolding: Factsheet
- Suspended Scaffolding Safety Alert
- Falling objects from scaffolding: Safety alert
- Erecting, altering and dismantling scaffolding Part 2: Aluminium tower-frame scaffolding: A guide on health and safety standards February 2011
- Safe use of frame trestle scaffolding: A guide for employers and others
- Erecting, altering and dismantling scaffolding - Part 1: Prefabricated steel modular scaffolding
- Identification tool for aluminium mobile scaffolds: Hazard profile
- Requirements for trestle ladders in NSW – Position paper, 2006, CatNo.WC04943

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HS 02 Fabricated Platforms & Scaffolds V3

WORK HEALTH AND SAFETY INDUSTRY GUIDANCE

HEIGHT SAFETY - Elevating work platforms & work boxes

HAZARDOUS TASKS identified

Elevating work platforms and work boxes

A number of BIA members have recently begun to use various elevating work platforms (EWPs) to supplement their existing scaffold and other work platforms. EWPs include scissor lifts, cherry pickers, boom lifts and travel towers. A work box can also be elevated to allow tasks to be undertaken at heights however an EWP or scaffold system provides a higher level of safety.

While each of these devices can provide significant time savings as compared with scaffold erection etc, they can also create new hazards for the operators and people working nearby, so a thorough assessment is recommended prior to purchase and use.

A scissor lift EWP

Consultation is a legal requirement and an essential part of managing health and safety risks.

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RISKS to assess

Not all EWPs are suited to all work situations. Issues to consider when selecting EWPs include:-

- What height and reach is required for the tasks to be performed?
- Surface conditions in the travel and work areas, eg slope, surface and wheel load limits (eg concrete, soil, suspended slab, timber decking) including localised weaknesses such as pit covers?
- Travel restrictions, eg narrow doorways or paths, or height restrictions?
- Indoor or outdoor use?
- Will the EWP need a licensed operator?
- Is a fall arrest harness required during use?
- Is there a need to exit the EWP whilst elevated?

When assessing the risks arising from using EWPs you should consider the following:

- Are the workers operating the EWP trained in safe operating procedures of that particular brand and type of equipment?
- Has the training included the safe use of fall arrest equipment and emergency rescue procedures?
- Are the EWPs only used as working platforms? (They are not designed as a means of entering and exiting a work area unless the conditions set out in AS 2550.10 are met)
- Are the EWPs only used on a solid level surface? (unless they are designed for rough terrain)
- Has the surface area been checked to make sure that there are no penetrations or obstructions?
- Do persons working in travel towers, boom lifts or cherry pickers wear a properly anchored safety harness?
- Is the EWP to be used within the manufacturer's limitations? eg slope, wind conditions, load capacity?
- Do the workers who operate elevating work platforms with a boom length of 11 metres or more have a High Risk Work License?
- Is the surface area able to support the EWP and free of weak spots (eg pit covers), penetrations or obstructions

A boom lift EWP

WorkCover NSW warns of past accidents relating to forklift systems:

"Many serious accidents have occurred when people fail to use a correctly designed and constructed work platform, either from falls or being trapped by moving parts of the forklift elevating system. Standing on the forklift tines tines, on pallets or in stillages, are common causes of falls from height, while the improper use of a well-designed work platform can also result in serious injury…"

From: Work platforms for forklift trucks: Position paper

Work boxes / work platforms

Work 'boxes' or work 'platforms' are platforms with edge protection. They may be supported by a forklift truck, hoist, crane or other lifting devices. Work boxes utilised in the boating industry are primarily used on forklifts. When compared with scissor lifts work boxes are more complicated to use, pose a higher level of risk, and should not be used for frequent, routine tasks.

 A workbox that is elevated on a forklift	 This is NOT permitted!

When assessing forklifts with work boxes and their safe use, consider:

- Is the work box designed for the task and securely attached and prevents working coming into contact with any moving art of the forklift?
- Is the work box fitted with a suitable anchorage capable of withstanding the fall forces? (ie as specified in AS/NZS 1891.4 *Industrial fall-arrest systems and devices—Selection, use and maintenance*.)
- Are workers attached to the anchorage by a lanyard and harness where the work is being undertaken outside the confines of the box?
- Is it designed in accordance with AS 2359 *Powered Industrial Trucks*
- Are the workbox, lifting attachments and records checked by a competent person before use?
- Do workers remain within the work box while they are being lifted or suspended?
- Does the operator always avoid suspending the box over people?
- Does the forklift operator stay at the controls of the forklift at all times?
- Does the forklift have a device to prevent uncontrolled lowering of the workbox?
- Is the safety gate self-locking and kept closed when the box is elevated?

RISK CONTROL options

When you are deciding if an elevating work platform and/or a work box will be useful in your workplace, business, it's important to talk to suppliers about your site and your needs. A site visit by the supplier can assist you to determine the best options. As well as having the right equipment, verification of competency is critical to ensure all parties know how to operate the specific EWP.

Case study – Scissor-lifts

A few marinas now routinely use various scissor-lift elevating platforms. In some cases these are purchased – including from the second-hand market – and others find it more economical to hire or lease them for particular jobs. Whether the device is new or second hand it must be maintained in accordance with the relevant standards (eg AS 2550.10).

One manager was especially happy with the scissor-lift they purchased 2 years ago, saying it was a "really fabulous" aid, saving the business time and effort for many of their jobs.

If the Elevating Work Platform is to be used as a means of access and egress from the boat you must meet the strict requirements of AS 2550.10, and this includes the use of a harness regardless of whether it is a boom lift or a scissor lift.

Scissor lifts used at marinas in Sydney

Case study – Work boxes vs Scissor lifts?

A few marinas use work boxes as forklift attachments to access the top of their travel lifts for servicing and maintenance tasks. In hindsight some believe it may have been more economical to use a scissor-lift EWP and/or rent a certified work box when they need one for any unusual or 'one-off' jobs. Scissor-lifts are generally a safer and more versatile option, and work boxes should only be considered for special tasks of short duration.

Workbox used by Mariana. Note upper mesh panel of workbox is not shown.

Businesses also need to ensure that all forklift attachments are certified, used for the intended purpose, and the forklift load plate includes the relevant information as per Australian Standard 2359.1 or similar.

Case study – Elevating Work Platforms for moving between sites

This commercially available portable aerial work platform, made from a high-strength steel base with a lightweight aluminium mast and platform, reportedly allows work up to a height of 4.3 metres. The supplier claims that the unit can be assembled in around 30 seconds. The work platform has a work tray to carry tools and materials. The platform is powered using a compact, variable speed power pack with battery packs that can elevate and descend 20 times from one charge.

Further guidance

- Work Health and Safety Regulation
- Code of Practice – Managing the risk of falls at workplaces
- Australian & New Zealand Standard 1891.1:2007 Industrial fall-arrest systems and devices - Harnesses and ancillary equipment
- Australian & New Zealand Standard 1891.2:2001 Industrial fall-arrest systems and devices - Horizontal lifeline and rail systems
- Australian & New Zealand Standard 1891.3:1997 Industrial fall-arrest systems and devices - Fall-arrest devices
- Australian & New Zealand Standard 1891.4:2009 Industrial fall-arrest systems and devices - Selection, use and maintenance
- Australian Standard 2550.1:2011, Cranes, Hoists and Winches – Safe Use – General Requirements
- Australian Standard 2359.1:1995, Powered industrial trucks – General requirements
- Australian Standard 2359.2:1985, Powered industrial trucks – Operation
- Australian Standards 2550.10:2006, Cranes Safe Use - Elevated Work Platforms

WorkCover NSW guides:

- Work platforms for forklift trucks: Position paper, CatNumber: WC04399
- Overturned boom-type elevating work platform: Safety alert CatNumber: WC03042
- Safe working at heights: Guide, CatNumber: WC01321
- Working at heights - Part 1: Falls from heights: Factsheet, CatNumber: WC05891
- Utilities Working at Heights Resource

Note: This material provides a brief overview of some of the key issues and readers are directed to the further guidance material provided and to seek expert advice as required. Each business should utilise risk management principles, including consulting relevant workers, to ensure any control measures implemented are properly tailored to the site, workers and tasks.

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WORK HEALTH AND SAFETY INDUSTRY GUIDANCE

HEIGHT SAFETY – Using harnesses

HAZARDOUS TASKS identified

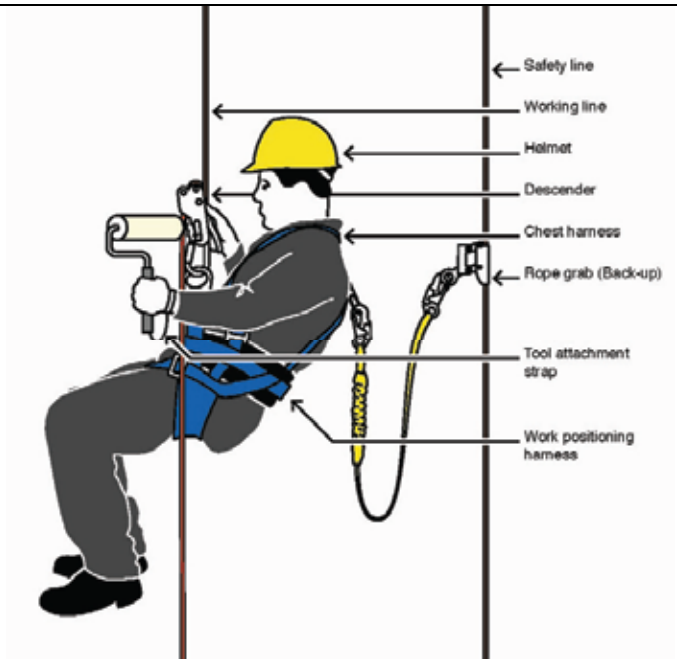
Harnesses are one of the 'lower level' control measures for the prevention of falls as they are less safe and less reliable than other controls. They should only be used where it is not reasonably practicable to use higher level controls or where higher level controls are not fully effective in preventing a fall when used on their own.

Harnesses can cause harm, including death from 'suspension trauma' (as outlined in a case study later in this document). For these reasons it's critical to understand the hazards associated with harness use, and the environments for which they are designed. Some common errors seen in harness use include: harness incorrectly fastened; lanyard / preventer line is too long allowing a fall or not suited to task; unsuitable anchorage point; and lack of supervision.

Despite the potential problems with harness use, when they are properly installed and used correctly they can be useful in the following situations:

- for work positioning or rope access
- as a travel restraint
- for individual fall arrest

Each of these systems is outlined in the following table.

Work positioning or rope access systems These allow a person to be suspended and supported in order to work at an otherwise inaccessible area. For example, to clean and polish a large fly-bridge cruiser one approach may be to use a rope access system anchored to a point on or near the top of the fly-bridge to reach areas of the vessel that cannot be reached by other means.	 *Figure 1- Industrial rope access system.* *Where possible it is always better to use other, safer means to access high areas such as Elevating Work Platforms etc.* *Note – A work positioning harness is now referred to as a lower body harness*

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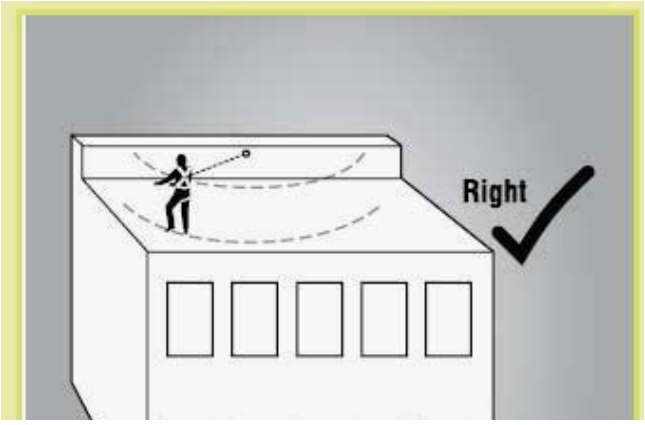
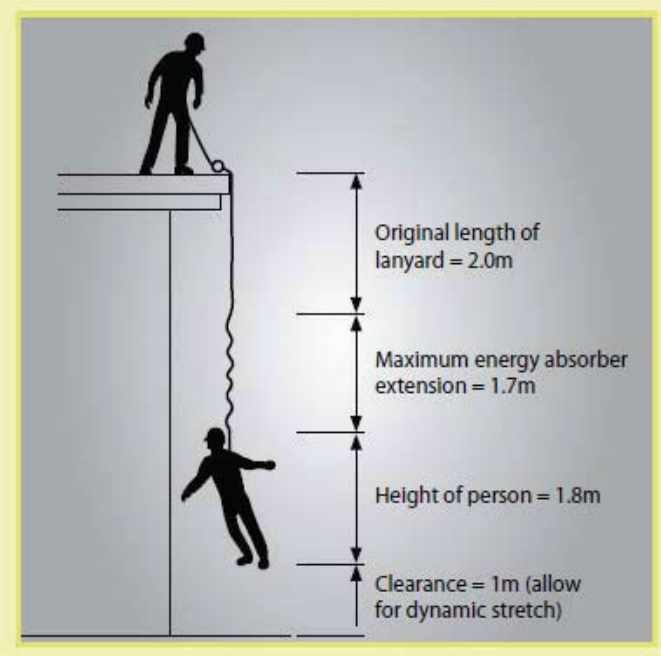
Travel restraint systems These systems prevent the use from reaching an edge where they could fall. A travel restraint system consists of a harness (compliant with AS/NZ 1891.4 2009) connected by a lanyard to a suitable anchorage point or static line.	 *Figure 2 – Travel restraint. These systems must only be used if it is not reasonably practicable to prevent falls by providing a physical barrier such as a guard rail.*
Individual fall arrest systems An individual safety harness is designed to prevent or reduce the severity of an injury to a person if a fall does occur. Other fall arrest systems are catch platforms and industrial safety nets.	 *Figure 3 – Individual fall arrest system showing the clearance required to absorb energy and prevent the user from striking the ground.* *Individual fall arrest should be used instead of a travel restraint system if **any** of the following 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, for example fragile material* • *the slope is over 15 degrees* • *there is any other reasonably likely use or misuse of the system which could lead to a free fall*

Consultation is a legal requirement and an essential part of managing health and safety risks.

A safe workplace is more easily achieved when everyone involved in the work communicates with each other to identify hazards and risks, talks about any health and safety concerns and works together to find solutions. This includes cooperation between the people who manage or control the work and those who carry out the work or who are affected by the work. By drawing on the knowledge and experience of your workers, more informed decisions can be made about how the work should be carried out safely.

RISKS to assess

Before using a harness other means of gaining safe access to heights must ALWAYS be investigated. Harness systems should only be used when it is not reasonably practicable to:

- work from the ground or solid construction, or
- use a fall prevention system such as edge protection, scaffolding, work platform, scissor lifts or similar.

Using any sort of harness system requires a high level of skill, and comprehensive assessments. For example, just *some* of the issues to assess and to manage ***prior*** to using any harness system are:

- Establish whether the system is designed as a travel-restraint or fall-arrest
- Assess anchor points to be used – are they sound and up to bearing the load (with regard to their intended use and likely weight loadings) in the direction that would result from a fall;
- Assess the line to be used – is it sound, and if so up to the loads to be placed on it
- Assess junctions between line and anchor points
- Assess all of the above with regard to lanyard connecting worker to the line
- Assess the amount of slack in fall arrest line, allowing for energy absorption, height of worker etc as illustrated in Figure 3 above
- Assess if there is adequate clearance
- Assess inertia reels
- Assess that all system components are compatible and are suited to the task and environment

An experienced yachtsman provides these additional suggestions:

- a bow-line knot tied by a competent person should be used in preference to shackles or other couplings
- A suitable line may include a "retired" yacht halyard as this would be rated to a high breaking strain

It is also a requirement that you:

- provide training to workers
- develop and practice a rescue plan
- provide supervision of workers using harness systems
- ensure ongoing inspection and maintenance for anchorages and equipment

Do you have the right harness for the job?

There are many different harnesses in use in the boating industry, including:

- yachting harnesses and lines;
- dinghy 'trapeze' harnesses;
- windsurfing harnesses; and
- seat harnesses for fast motor boats.

None of the above harnesses are intended to provide protection from falling from a height.

Harnesses that are specifically designed for falling from a height **must** meet the standards in the series 'AS/NZS 1891 Industrial fall-arrest systems and devices'. This series of standards

(1891.1, 1891.2, 1891.3 and 1891.4) provide detailed advice on: Harnesses and ancillary equipment; Horizontal lifeline and rail systems; Fall-arrest devices; and the selection, use and maintenance of the equipment.

Check your harness, and if it's to be used for protection from falling from a height it should have a statement on the label such as *'This harness meets the requirements under AS/NZS 1891.4'.*

A harness in use at a Sydney marine business, with the harness label showing that it is '*Manufactured to AS/NZS 1891.4'* as well as providing a serial number and when to remove the device from service etc.

Components of a typical height safety kit as seen in a 'roofer's or 'construction' kit.

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RISK CONTROL options

When correctly installed and used correctly harnesses can assist to reduce falls where other systems are not reasonably practicable. Examples of systems used by marine businesses are provided below.

As previously noted, other fall arrest systems that do not use harnesses and lines may be a better option where there are risks of falls. For example catch platforms, industrial safety nets or cushioning systems may be more practicable options for the task and for the work site.

The use of static (Jack) lines, horizontal lines to which a lanyard attaches, although common practice, should only be used when assessed and installed by a competent person. Suitable anchorage points and suitable static lines are perhaps the most complex part of travel restraint or fall arrest system when used on boats.

The anchorage point's capacity will vary according to how many people are using the point, if the point is used as part of a travel restraint system (to prevent someone reaching an edge where they could fall) or as part of a fall arrest system (to limit free fall).

The requirements for static lines for boats on the hardstand are much more stringent than static lines used on boats in water. All anchorages, lines and attachments must be tested and approved by a competent person to ensure their impact and load capacities suit their intended use.

Two recent, comprehensive studies have confirmed the many problems with these systems (HSE 2004 & HSE 2002), and a summary is provided in the following box.

Research reports - Common problems with fall arrest systems

Studies from the United Kingdom examined fall protection systems in use across industries internationally and noted many common problems with both the lines, harnesses and other components.

"*To look at, temporary-installed horizontal life lines (HLLs) are very simple. But in terms of the fall-arresting process, they are very complex. Consequently, the design and installation of temporary-installed HLLs is not just a matter of stringing up some randomly chosen rope in an improvised manner, and in the process relying on a good degree of guesswork. HLLs are engineered systems and require engineering disciplines and approaches in order to ensure that they will perform as intended.*

There is a general lack of understanding of the criteria involved in the design, installation and control of fall-arresting systems (FAS) based on temporary-installed HLL, particularly by those who have to select and install these systems at the workplace."

Legal requirements

All equipment used in fall arrest systems should be designed, manufactured, selected and used in compliance with the AS1891 series of standards, and businesses using these systems also must comply with the new national WHS Regulation. A summary of the key points regarding fall arrest system requirements is provided in the box below.

Legal requirements for fall arrest systems in WHS Regulation

The new draft WHS Regulation outlines the specific requirements to meet where individual fall arrest systems are used, and these include:

"If a person conducting a business or undertaking provides a fall arrest system as a control measure…. the person must:

- ***establish emergency procedures**, including rescue procedures, in relation to the use of the fall arrest system.*

*The person must **ensure that the emergency procedures are tested** so that they are effective.*

*The person must provide relevant workers with **suitable and adequate information, training and instruction** in relation to the emergency procedures.*

In this regulation, relevant worker means:
(a) a worker who, in carrying out work in the business or undertaking, uses or is to use a fall arrest system; and
(b) a worker who may be involved in initiating or implementing the emergency procedures"

Case study – Using travel restraint during yacht construction

A business that designs and builds cruising yachts requires workers to be on the top of the yacht during the construction process prior to guard rails or work platforms being available.

To prevent workers from reaching the edge of the boats and falling off the manager has installed a horizontal lifeline the length of the boat. Staff wear a harness that is attached to the line via lanyards, and this allows them to move and work on the deck more safely. Note that finding suitable anchorage points for harnesses and lifelines is complex and is a common reason for system failure. All components of the system should meet Australian Standards.

Horizontal line above the boat that is under construction

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Case study – Using harnesses for fall arrest

A large Sydney marine service centre was purpose built to accommodate large vessels for maintenance and repair tasks, and it's not uncommon for personnel to be working at heights from 2 to 12 metres off the hardstand. While the centre utilises a number of 'passive fall prevention devices' - such as scaffold systems and EWPs – the OHS Manager identified tasks that could not be safely done using these aids.

As the OHS Manager explained:
"*The solution that (we) eventually adopted involved staff wearing safety harnesses which they connected via a rope drop line to a fall arrest device mounted in the roof of the work sheds.*

This fall arrest device is similar in principle to inertia car seat belts. The fall arrest device was attached to an overhead traveller designed and implemented to suit the work sheds and the variety of vessels.

The overhead traveller connection runs via multiple high-tension heavy-duty cables strung from the building/work shed roof structures. With six runs of cables, and two fall arrest devices from each cable run, full coverage across the two main works sheds was obtained."

"The locking snap hook mechanism links to the "D" shackle on the rear of the harness when working at heights of 2-6 metres. The design of the fall arrest device allows only a 300mm fall before an automatic lock off mechanism activates. In effect, this provides a strict limit on sudden fall movement before the fall arrester 'locks'.

When working at heights greater than 6 metres, the harness shock absorber lanyard is used. This connects via the "D" shackle with the locking snap hook mechanism. This permits the user to carry out work tasks with a greater degree of freedom. The shock absorber lanyard length is standard at 2 metres."

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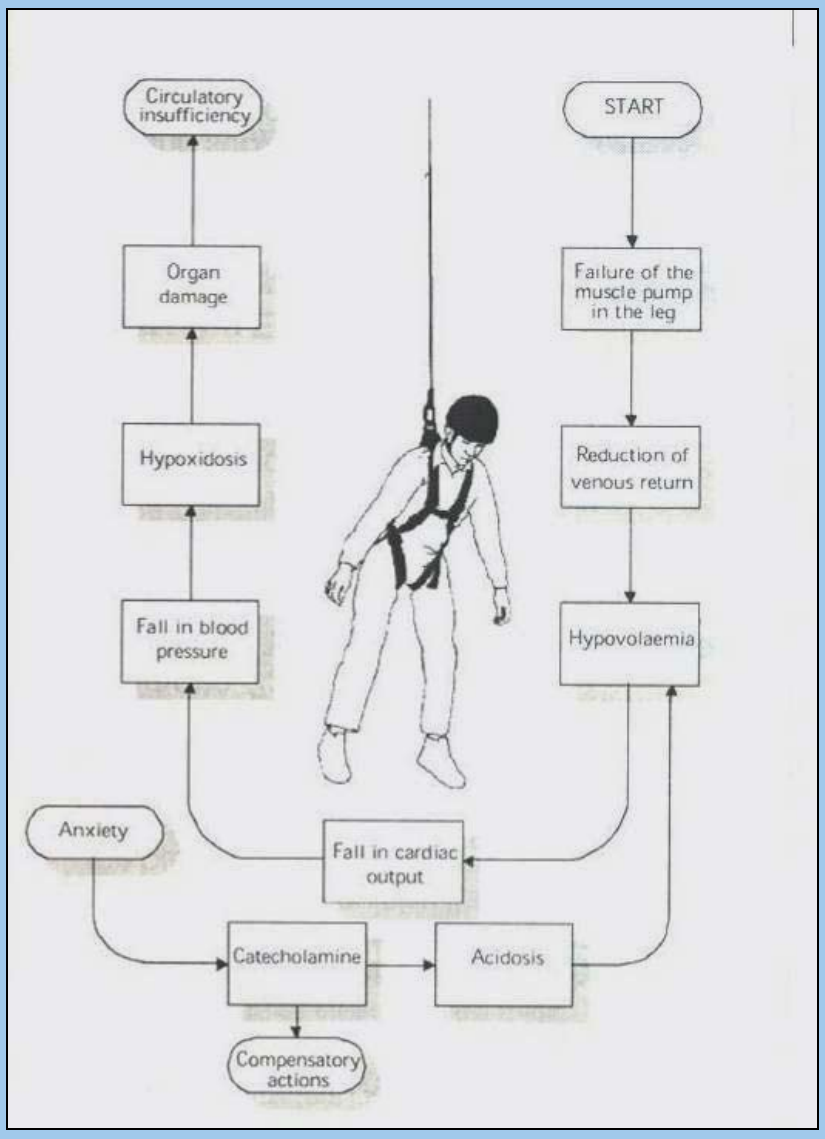
Case study – Things that go wrong with individual fall arrest systems …

There are many things that can go wrong with harness use on individual fall arrest systems including:
- swing downs – allowing the worker to contact the ground
- swing backs – allowing the worker to hit the side of a structure
- anchorage points failing
- incorrect use
- mixing incompatible equipment (such as lanyard too long)
- reliance on user skill and competence
- 'suspension trauma' from hanging in the harness



If a person falls and is unconscious and held suspended in an upright position this posture can result in 'suspension trauma' or 'orthostatic shock'. This syndrome occurs from the impact of venous pooling and reduced cardiac output, as illustrated in the figure above.

Death can occur in less than 10 minutes.

Immediate rescue and careful treatment following suspension is also critical to achieve a good outcome for the casualty.

Further guidance

- Work Health and Safety Regulation
- Code of Practice – Managing the risk of falls at workplaces Safe Work Australia
- Australian and New Zealand Standard 1891.1:2007 Industrial fall-arrest systems and devices - Harnesses and ancillary equipment
- Australian and New Zealand Standard 1891.2:2001 Industrial fall-arrest systems and devices - Horizontal lifeline and rail systems
- Australian and New Zealand Standard 1891.3:1997 Industrial fall-arrest systems and devices - Fall-arrest devices
- Australian and New Zealand Standard 1891.4:2009 Industrial fall-arrest systems and devices - Selection, use and maintenance
- Australian and New Zealand Standard 4488 Industrial rope access systems

WorkCover NSW advice:

- Code of Practice – Safety Line Systems (WCA)
- Safety Guide – Use of fall arrest systems (WCA)

Other

- Burgess Limerick R, 2003, Issues related to the wearing of fall-arrest harnesses in the construction industry, *Ergonomics Australia*, Vol 17, 3:18-24
- Seddon P, 2002, Harness suspension: review and evaluation of existing information, Health & Safety Executive, Research Report 451/2002
- Rushworth A & Mason S, 1987, Aids to selecting fall-arrest harnesses: the ergonomic considerations, *Safety Practitioner* cited in Burgess Limerick
- Health and Safety Executive, 2004, A review of criteria concerning design, selection, installation, use, maintenance and training aspects of temporarily-installed horizontal lifelines
- Health and Safety Executive, 2002, Harness suspension; review and evaluation of existing information

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WORK HEALTH AND SAFETY INDUSTRY GUIDANCE

HEIGHT SAFETY – Using portable ladders

HAZARDOUS TASKS identified

Working from a ladder

Each year in Australia there are many accidents associated with portable ladder use, often with serious consequences. When workers are using ladders at heights over 2 metres the risk is further increased. Compared with other methods to undertake work at heights – such as from scaffold systems and other temporary work platforms - ladder use is rated as a fairly poor and 'low level' control.

Warnings

WorkCover NSW advises that ladders:

- *"…Should only be used to carry out light duty work of short duration"*

The new Code of Practice specifically states:

- *Ladders must only be used when it is not reasonably practicable to use a higher level control measure.*
- *Make a record where ladders or an administrative control is the only control that is reasonably practicable to implement when minimising the risk of a fall over two metres, and keep the record until the work is completed.*

In the boating industry ladders are commonly used:

- To gain access to the boat when it is out of the water
- To reach a section of the hull or external fittings and fixtures

Consultation is a legal requirement and an essential part of managing health and safety risks.

A safe workplace is more easily achieved when everyone involved in the work communicates with each other to identify hazards and risks, talks about any health and safety concerns and works together to find solutions. This includes cooperation between the people who manage or control the work and those who carry out the work or who are affected by the work. By drawing on the knowledge and experience of your workers, more informed decisions can be made about how the work should be carried out safely.

RISKS to assess

Portable ladders

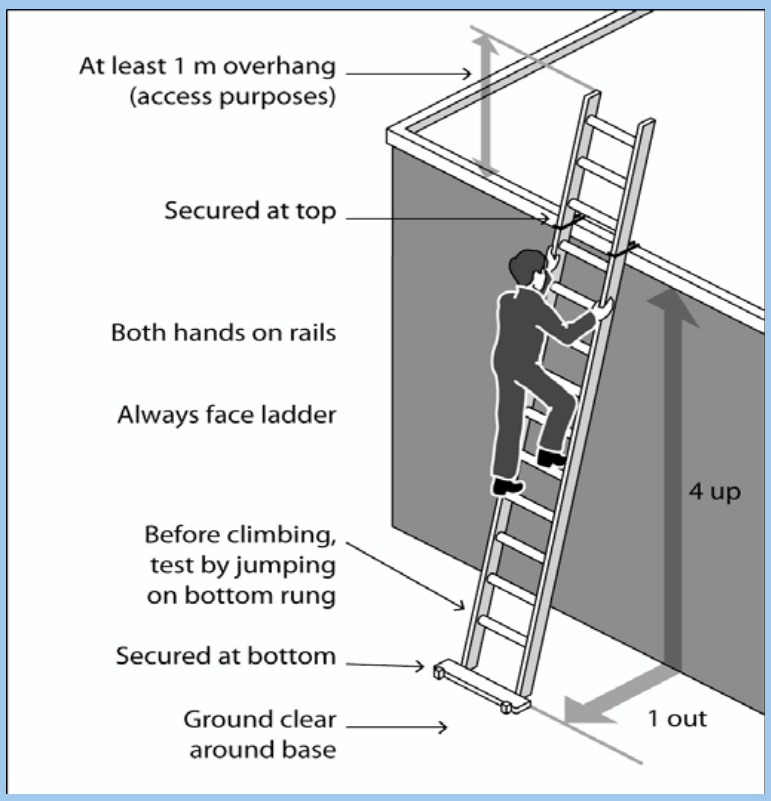
If you are using portable ladders such as step ladders, extension ladders and hanging ladders you must assess:

Ladder design features

- Type of ladder use – are extension and single ladders only used for access and egress - not as a working platform?
- Load rating – is it at least 120kg, and manufactured for industrial use?
- Slip resistance – is there some slip resistance on base, rungs and/or steps?
- Condition— is the ladder inspected for faults, such as broken rungs, stiles and footing before it is used?

Setting up the ladder

- Ground conditions – is the ladder on firm, stable and level ground? (not on scaffolding or other elevated work platforms)
- Slope of the ladder – is it at a slope of 4:1, with step ladders in the fully open position?
- Attachment methods – is it attached at the top or bottom ends or both?
- Locking devices on the ladder – are they all secured?
- Height – is it suited to task to avoid over-reaching, and with extension ladders extending at least 1 metre above the stepping off point?



*Using the ladder**

- Tool use – are only light tasks undertaken while on the ladder (ie not requiring high force or heavy or awkward loads) and where three points of contact can be used (avoiding 2-handed tools)?
- Rung use – can workers avoid standing higher than the 2nd tread below the top plate of any step ladder (with the exception of three-rung step ladders) or avoid standing on a rung closer than 900 mm to the top of a single or extension ladder?

- Orientation - Can workers always face the ladder when going up or down, or when working from it?
- Position – can work areas be accessed from the ladder without over reaching

**If these conditions for ladder use cannot be met, a ladder may not be appropriate and other methods such as EWPs, scaffolding or temporary work platforms should be considered.*

RISK CONTROL options

Instead of using step ladders, consider using platform ladders or step platforms. These ladders are commercially available in a wide range of sizes and to various load ratings. They typically have handrails, are topped by a platform, and are easy to move then lock in position with various wheel systems. Alternatively controls higher up in the Hierarchy of Control such as EWPs, scaffolding or temporary work platforms may be a better and safer option.
The following table illustrates examples of platform ladders used at marine businesses.

A label on a ladder indicating the safe working load. The load rating includes the operator weight plus their tools and materials.

There are many other access platforms that are custom–made and mobile that may suit building, maintenance and repair work in the boating industry and provide a safer option than step ladders and extensions ladders.

Further guidance

- Work Health and Safety Regulation
- Code of Practice – Managing the risk of falls at workplaces, Safe Work Australia
- Australian and New Zealand Standard 1892.1:1996 Portable ladders Part 1: Metal
- Australian and New Zealand Standard 1892.2:1992 Portable ladders Part 2: Timber
- Australian and New Zealand Standard 1892.3:1996 Portable ladders Part 3: Reinforced plastic
- Australian and New Zealand Standard 1892.5:1999 Portable ladders Part 5: Selection, safe use and care
- Australian and New Zealand Standard 1657:1992 Fixed platforms, walkways, stairways and ladders – Design, construction and installation
- Australian and New Zealand Standard 4994.1:2009 Temporary edge protection - General requirements

WorkCover NSW guides:

- WorkCover Safety Guide: Portable Ladders (Safety Guide No 4503)
- WorkCover Position Paper: Working of stepladders
- Safe working at heights: Guide, CatNumber: WC01321
- Working at heights - Part 1: Falls from heights: Factsheet, CatNumber: WC05891
- Working at heights - Part 2: Falling objects CatNumber: WC05892
- Safe use of portable ladders: Safety alert CatNumber: WC02790
- Position Paper - Working Off Stepladders, CatNumber: not provided
- Utilities working at heights resource, 2006, CatNo: not provided

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