

## SAFE WORKING AT HEIGHTS

This training is based on the National Units of Competency:

RIIWHS204E

Work Safely at Heights

### Training Course Overview

You will learn about:

- Conduct a workplace heights risk assessment
- Identify work area requirements for working at heights
- Accessing work area and correct installation of heights safety equipment
- How to conduct work at height tasks using a range of height safety equipment
- Heights rescue procedures
- Work completion clean up



Falls are a major cause of death and serious injury in Australian workplaces. Fall hazards are found in many workplaces where work is carried out at height, for example stacking shelves, working on a roof, unloading a large truck or accessing silos. Falls can also occur at ground level into holes, for example trenches or service pits.

### **When is a worker considered to be working at height?**

***“any time where there is a risk of a fall from one level to another that may lead to an injury”***

**Risk of a fall** means a circumstance that exposes a worker while at work, or other person while at or in the vicinity of a workplace, to a risk of a fall that is reasonably likely to cause injury to the worker or other person. This includes circumstances in which the worker or other person is:

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

Falling 2.2 metres can lead to impact forces of up to 2,200kgs  
You need to work safely and follow procedures

**Risk control** means taking action to eliminate health and safety risks so far as is reasonably practicable, and if that is not possible, minimising the risks so far as is reasonably practicable. Eliminating a hazard will also eliminate any risks associated with that hazard.

**Competent person** means a person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.

## Compliance

When performing any work at heights, persons conducting a business or undertaking (pcbu), workers and contractors are bound by:

- **Work Health & Safety Act 2011**
- **Work Health & Safety Regulations 2011**
- **Managing the risk of falls at Workplaces Code of Practice &**
- **Australian Standard – Industrial fall arrest devices AS1891 series**

## Summary

The Work Health and Safety Act, The Work Health and Safety Regulations, Codes of Practice and Australian Standards are compliance documents that must be adhered to, and they require you to:

- Risk Assess all work to be done
- Consult with all workers during the risk assessment process
- Apply appropriate control measures to all hazards identified

Who has responsibilities under these WHS documents?

- The self-employed
- Persons in control of a workplace
- Principal contractors
- Designers, manufacturers and suppliers
- Erectors and installers
- Workers and other persons at the workplace

**NO ONE IN THE WORK PLACE IS EXEMPT!**



## Planning and preparing to work at heights

- Risk Assess the work to be completed
- Complete the Heights/Work Permit
- Follow work instructions
- Set up rescue procedures
- Ensure all workers are competent



### How to assess the risk

A risk assessment will help you determine:

- ✓ what could happen if a fall did occur and how likely it is to happen
- ✓ how severe a risk is
- ✓ whether any existing control measures are effective
- ✓ what action you should take to control the risk
- ✓ how urgently the action needs to be taken.

### Generic Risk Assessments

If you are responsible for a number of different work areas or workplaces and the fall hazards are the same, you may perform a single (or generic) risk assessment. However, you should carry out a risk assessment on individual fall hazards if there is any likelihood that a person may be exposed to greater, additional or different risks.



## Rescue and Emergency Procedures

Whenever there are risks from working at height, appropriate emergency procedures and facilities, including first aid, must be established and provided. Typical injuries from falls can include unconsciousness and occluded airway, suspension trauma, impalement, serious head or abdominal injuries and fractures.

A person using a fall-arrest system could suffer suspension intolerance as a result of a fall. The WHS Regulations contain a specific provision to address the need for emergency and rescue procedures for such situations.

**Regulation 80 states:** “A person conducting a business or undertaking who implements a fall-arrest system as a measure to control risk must establish emergency and rescue procedures

The procedures must be tested so that they are effective. Workers must be provided with suitable and adequate information, instruction and training in relation to the emergency procedures.”

**Regulation 42 states** “You must ensure that workers have access to first aid equipment and facilities for the administration of first aid. You must also ensure that workers are trained to administer first aid or that workers have access to persons who are trained in first aid. “

## 2.1.8 Training & Competency

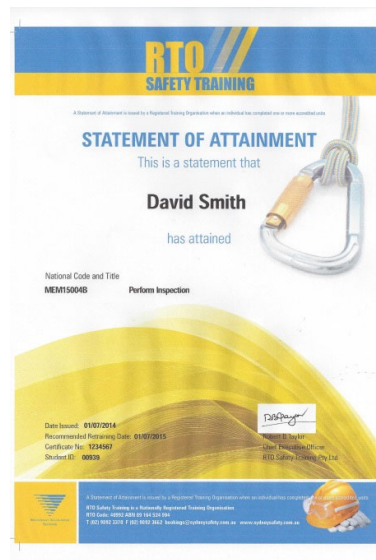
**Competent person** means a person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.

Typical training is:

**1 Day Work Safely at Heights Course** – units of competency under the RII Package accredit a person to work at height.

**1 Day Heights Rescue Operator** – this is an extension to the 1 Day Work Safely at Heights course providing participants with additional HEIGHTS RESCUE training to meet the requirements of Regulation 80 above. Participants will be exposed to numerous heights rescue systems which will allow them to select an appropriate heights rescue system to meet a particular work environment.

**Height Safety Equipment Inspector** – 4 hour programme to qualify attendees to conduct periodic inspections of height safety equipment in compliance with AS/NZ 1891.4. Attendees must have completed a National Accredited Safe Work at Heights Course.



## Hierarchy of Controls for Working at Heights from the Code of Practice



## Individual Fall Arrest PPE Systems

A review of fall arrest systems in their order of priority of use are:

1. **Restraint Technique** – The **preferred** system where your anchor location and your lanyard length DO NOT ALLOW you to physically be exposed to a fall risk. NO RISK OF FALL
2. **Restrained Fall** – A fall where the person is wearing a pole strap, or similar device that partially restrains the fall.
3. **Limited Free Fall** – Is any fall either vertically or on a slope that does not exceed 600 mm. This occurs when using a very short and well adjusted lanyard, when working on a sloping roof in restraint or when using an inertial reel/retractable lanyard correctly positioned.
4. **Free Fall** – This is the arrest of a fall either vertically or on a slope where the wearer falls further than 600 mm and no further than 2m before the system takes on load.

***Let's now discuss the issues you need to consider if you HAVE to work in  
FREE FALL.***

An individual fall arrest system is made up of:

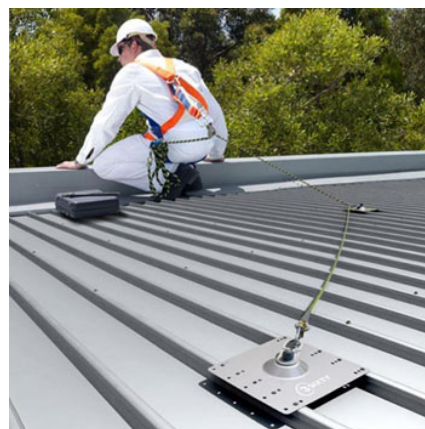
1. Anchor point
2. Lanyard or safety line with a shock absorber
3. Harness

### Anchor Point

Each anchorage point should comply with the requirements in AS/NZS 1891:4 *Industrial fall-arrest systems and devices – selection, use and maintenance*.

1. Anchor rating for **ONE person is 15kn**
2. Anchor rating for **TWO people is 21kn**

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

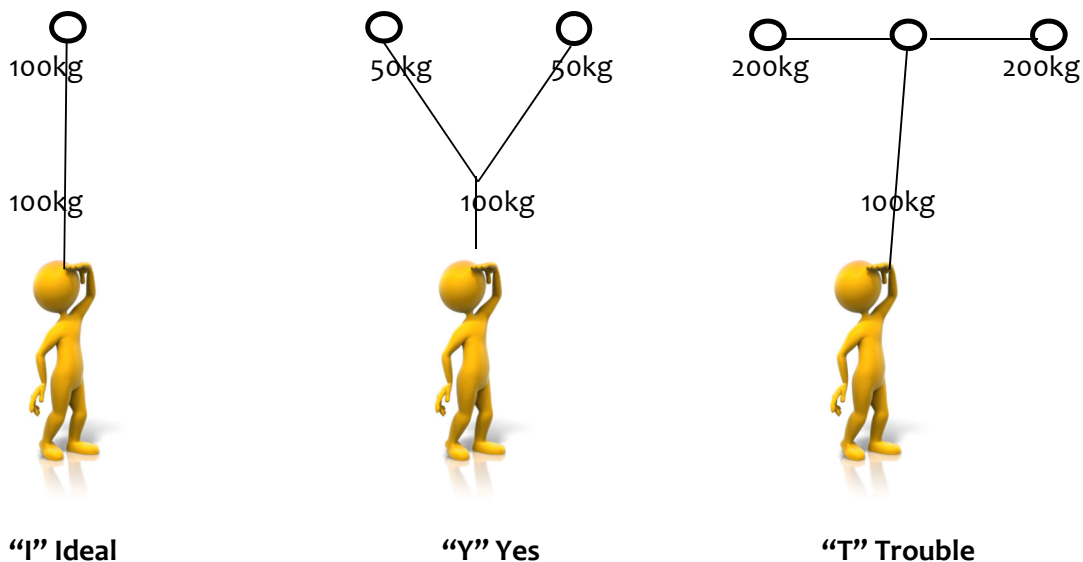


## Anchor Set Up

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

## Anchor Loading

Further considerations when connecting to anchors is angle of loading:



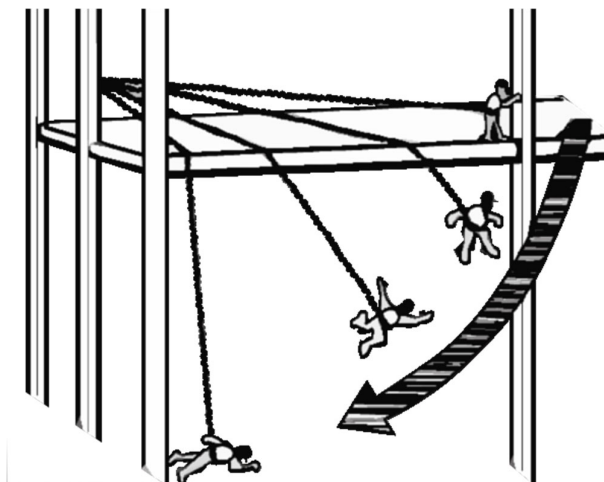
## Pendulum Effect

Another consideration when locating or using anchor points is the possibility of "pendulum effect" if you fell.

**The outcome of "Pendulum Effect" could be:**

1. Death/Serious injury from hitting structure
2. Death/Serious injury from hitting ground
3. Death/Serious from severed lanyard or line

**How to stop "Pendulum Effect" – use redirecting anchors**





## Anchor Attachments

1. Karabiners
2. Mallions
3. Snap Hooks & Scaffhooks
4. Sling/Straps

**Karabiners** are used to connect workers to lines, workers to rope rescue devices, lanyards to anchor points etc.



Screw Gate



Autolock - Double Acting



Autolock - Triple Acting

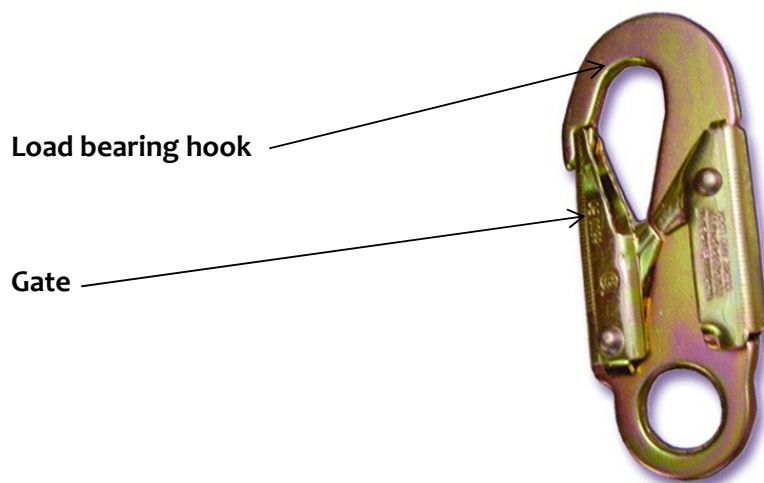
## Rules for using a karabiner

- ✓ Ensure the gate is locked
- ✓ Ensure the karabiner is oriented by screwing to earth (gravity locked)
- ✓ Load applied through spine of karabiner
- ✓ Never load across the gate

**Mallions** come in a variety of shapes and sizes. They are not designed to be opened and closed for quick connection, more over they are a permanent connector that needs to be locked screwed closed. They can be typically used to permanently connect a lanyard to a harness. Remember, these devices do come unlocked through constant use, so need to be carefully checked prior to each use.



**Snap Hooks** are quick connectors, and must have a minimum of double action. You will normally find these connected to lanyards where you can easily connect and disconnect. Remember the snap hook must be compatible with the D ring to stop “ROLL OUT” and the “gate” of the snap hook must not be used for load bearing, just the end of the hook.



\* Note – any damage to the snap hook renders it inoperable.

**Anchor Slings and Straps** are quick and easy items that allow you to create a temporary anchor point on structure. Remember that you need to assess the structure first to ensure it will hold a load of 15kn for one person or 21kn for two people before placing an anchor sling or strap on it.



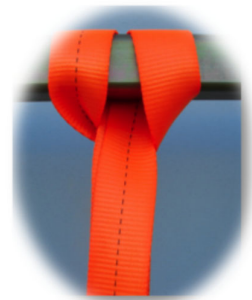
**Anchor Sling**



**Anchor Strap**

## Rules for using anchor sling

- ✓ Wrap sling around structure
- ✓ Never “BACK LOOP”/choke/reeve
- ✓ Assess structure for suitable load bearing prior to attaching
- ✓ Protect from sharp edges



## Harness

When working at height all workers need to wear a full body harness. This harness has to have front and rear fall arrest connecting points.



- Chest D Ring
- Dorsal D Ring
- Pole Strap Ds
- Manufactured to AS1891
- Working life 10 years maximum
- Inspected 6 monthly by competent person & logged
  - Inspected before & after use by operator
- Remove from service if damaged
- Can only be subject to ONE SHOCK LOADING
  - CANNOT work suspended in the standard harness. This can cause DEATH or toxic shock syndrome unless harness approved for this use ie Tower Harness

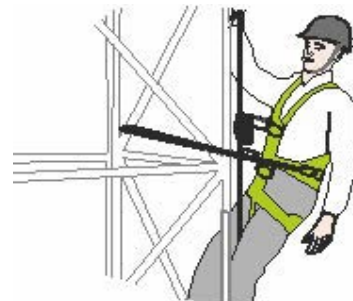
## Rope Grab

Rope Grabs provide more flexibility as the user can manually adjust the lanyard length to suit the situation. Rope Grabs can come in any length, starting at 1m to 100m. The most popular rope grab lanyard is the 5m unit. These units should have an SHOCK ABSORBER fitted to the adjustable rope grab unit



## Pole Strap

The pole strap is an adjustable lanyard that typically goes around a pole or structure to create a work positioning situation. If a work falls with a pole strap correctly positioned, they will have what is known as a restrained fall. Pole straps are only connected to the “D” rings located on each hip, and they must be situated around the structure above waist level to be effective. They allow the worker to use both hands to complete a job.



## 4.1.2.9 Shock Absorbing Lanyard

A lanyard is made of two key components – **lanyard and shock absorber**.



*Single Elastic Lanyard 2.0m*

*Twin Tail Elastic Lanyard for climbing*

**Shock Absorber is in place to absorb the shock loading of a fall. The SHOCK ABSORBER IS ALWAYS CONNECTED TO THE PERSON, not the anchor point!!!**

- It takes 200kgs of force to commence deployment of the shock absorber.
- Maximum shock loading on your body is 600kg
- Can extend a 2 metre shock absorbing lanyard by up to 1.75 metres

These lanyards are only made to a maximum length of 2m. This is sometimes not always practical, so a rope grab which can be much longer than 2m is recommended. Rope grabs are explained in a later section under RESTRAINT.

## Types of Fall Arrest Devices designed for limited free fall

**Type 1 – is typically known as a rope grab or cable grab.** They can be used either horizontally or vertically. In the event of a fall they grab the rope or cable to arrest the fall. The horizontal system is a manual system, requiring the operator to physical operate the unit to adjust lanyard length and the unit locks on the rope in the event of a fall or tension. The vertical system is an automatic system, typically used for climbing fixed ladders and towers, the device tracks up the cable as you climb and in the event of a fall it grabs the cable to arrest your fall.



**Type 2 - is a retractable lanyard or inertia reel.** These are normally located above the worker, and as you move it extends or retracts the cable/webbing length automatically. In this position the worker is not to move any further than 30 degrees of vertical, otherwise the system is subject pendulum. If you fall the system locks automatically, creating a LIMITED FREEFALL. This system IS NOT used for restraint/working support.

Units vary in length from 2m, typically webbing, up to 70m using cable.



**Type 3 – is an inertia reel with a RESCUE WINCH built in.** It has exactly the same characteristics as a Type 2, but allows you to rescue the fallen worker by winching them back up or lowering to a safe location. Most commonly used in confined space work.

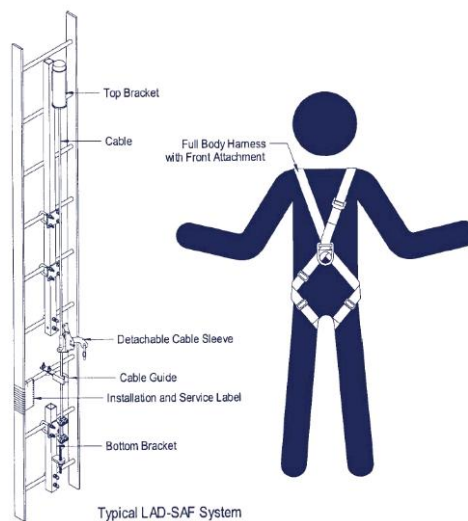


## Static Line Safety Systems

A static line safety system can either be vertical or horizontal, temporary or permanent. The system if temporary is typically made from rope (kernmantle or twist) or webbing. A permanent system is generally made from stainless steel or galvanised cable.

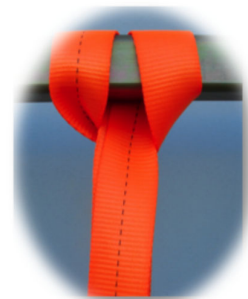
The advantage of this system is that it acts as a mobile anchor point (reducing the need to disconnect), in hard to access areas. You will see static cables located on top of buildings located approximately 2m back from an edge or on fixed ladders. They are a

proprietary system, installed by a competent person and certified. They then must be recertified every 12 months.



## Height safety systems points to remember

- ✓ Safe anchor (15kn for one person 21kn for two people)
- ✓ Don't choke anchor slings
- ✓ Don't use lanyards in conjunction with inertia reels
- ✓ Don't hook one lanyard to another
- ✓ Use shortest fall arrest lanyards possible
- ✓ Shock absorbing lanyards are not to exceed 2m length
- ✓ Type 1 fall arrest device lanyards used for vertical systems maximum length 300mm
- ✓ Maximum freefall distance 2mtrs
- ✓ Maximum force on the body 6kn (600kg)





## Fall injuries & emergency rescue

*Please remember, you do not want to have a fall when working at height.* All the PPE mentioned in this manual if used correctly is designed to either prevent a fall or to arrest a fall. If the fall needs to be arrested and you are set up correctly you will not hit the ground, but you still can die!!! How can you die?

1. **Physical injuries created as a result of the fall.** This could be broken limbs, fractured skull, or even building materials penetrating your body.
2. **Unconsciousness caused by an impact** which quickly leads to a blocked airway and death in 3-5 minutes
3. **Suspension trauma** - can occur with a fall-arrest system when a person has an arrested fall and is suspended in an upright, vertical position with the harness straps causing pressure on the leg veins. The lower legs' capacity to store large amounts of blood reduces the return of blood to the heart, slowing the heart rate, which can cause the person to faint. This may lead to renal failure and eventually death, depending on a person's susceptibility. This condition may be worsened by heat and dehydration.
4. **Toxic Shock** – can occur when a person in a fall-arrest system falls and is suspended upright. As for suspension trauma the harness leg straps place pressure on the veins reducing blood flow from the legs back to the body. The blood pooling in your legs can build up with toxic materials which if released back to the main body can cause the worker to sustain a heart attack, brain damage, renal failure and death.

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

Workers and emergency response workers must be trained in the rescue procedures and be able to recognise the risks of suspension intolerance and act quickly in the rescue of a person.

### Emergency procedures for falls

Whenever there are risks from working at height, appropriate emergency procedures and facilities, including first aid, must be established and provided. Typical injuries from falls can include unconsciousness and occluded airway, impalement, serious head or abdominal injuries and fractures.

A person using a fall-arrest system could suffer suspension intolerance as a result of a fall. The WHS Regulations contain a specific provision to address the need for emergency and rescue procedures for such situations.