

# Challenge Course

## Australian

### Adventure Activity

# Good Practice Guide

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<http://australianaas.org.au/about/>

To be read in conjunction with the '[Core Good Practice Guide](#)' – Download this from <http://yoursay.australianaas.org.au/challenge-courses/>

# Introduction

## About these documents

*The Australian Adventure Activity ‘Standard’ (Australian AAS) and related ‘Good Practice Guides’ are a voluntary best-practice framework for safe and responsible planning and delivery of outdoor adventure activities with **dependent participants**.*

*The Australian AAS (‘The Standard’) and related Good Practice Guides (GPG’s) provide guidance on safety and other aspects of responsible activity delivery, such as respect for the environment, cultural heritage and other users. They are not a full legal compliance guide, nor are they a “how to” guide or field manual for outdoor activities. They do not provide guidance on providing a high-quality experience over and above safe and responsible delivery.*

## Does the Standard and Good Practice Guides apply to me?

*‘The Standard’ and ‘GPG’s’ are specifically designed to help activity **providers** who are conducting activities involving **dependent participants**, to provide a safe and responsible experience ~~and meet their legal obligations~~. It is for each **provider** to determine based on their own individual circumstances, if they are working with **dependent participants** or not.*

*Refer to the Core Good Practice Guide for additional information.*

## Are they legally binding?

*The Australian AAS (‘The Standard’) and ‘GPG’s’ are voluntary, not legal requirements. However, they do frequently refer to specific laws and regulations which are legally binding.*

*While the ‘The Standard’ and ‘GPG’s’ are voluntary, some **land managers** and other organisations may require compliance. Either as a condition of a contract, or obtaining a licence, permit or other permission.*

*Refer to the Core Good Practice Guide for additional information.*

## Structure of the Standard and Good Practice Guides

*‘The Standard’ has a related ‘Core Good Practice Guide’ (Core GPG). They include guidance that applies to all adventure activities. They set out a common approach to risk management that generally applies regardless of the specific activity being undertaken.*

*Individual ‘activity Good Practice Guides’ include guidance on specific adventure activities.*

*For any given activity, (i) ‘the Standard’, (ii) the ‘Core Good Practice Guide’ and (iii) the ‘activity Good Practice Guide’ that applies to that specific activity, should be consulted.*

*‘The Standard’ and ‘Core Good Practice Guide’ cover only those activities specifically listed. While ‘The Standard’ and ‘Core Good Practice Guide’ may be useful in managing **risk** generally for other activities, they may not reflect best practice for such other activities.*

## Interpretation of the Standard and Good Practice Guides

*The following key words are used in all documents and have specific meanings:*

***MUST:** used where a provision is mandatory, if the **provider** is to operate fully in accordance with 'The Standard' or GPG's. (This is equivalent to the keyword "shall" used in other voluntary standards e.g. Standards Australia, other International Standards Organisations (ISO's) etc.)*

***SHOULD:** used where a provision is recommended, not mandatory. It indicates that the **provider** needs to consider their specific situation and decide for themselves whether it applies or is relevant.*

***CAN/CANNOT:** indicates a possibility and capability.*

***MAY/NEED NOT:** indicates a permission or existence of an option.*

***BUT ARE NOT LIMITED TO:** used to indicate that a list is not definitive and additional items may need to be considered depending on the context.*

*The following formatting is used throughout:*

Provisions - requirements, recommendations or considerations - are in normal Calibri text.

"Key words" are in ALL CAPITALS.

Defined words are in **bold**. They are defined in the Glossary.

Background information or discussion is in *italics*.

Examples are in *smaller italics*.

In document references are in underlined. References to other parts of this document are by section heading title. External references are in dotted underline italic.

## Disclaimer

*All reasonable attempts have been made to ensure the Standard and various Good Practice Guides are accurate, relevant and current at the date of publication. Nevertheless, the Standard and Good Practice Guides are only advisory and general in nature and may not be suitable for all contexts.*

*They are recommendations for voluntary application by adventure activity **providers**. They are not directly binding on any person or organisation and have no direct legal force.*

*The Standard and Good Practice Guides will not cover each and every circumstance of an adventure activity. Even when they are adhered to, they cannot entirely eliminate the **risk** or possibility of loss or injury.*

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## Creation

*The Standard and GPG's were developed with the input from a wide range of outdoors and adventure activity experts with extensive field experience. They draw heavily on state- and territory-specific standards previously in place across Australia. The development process included work by a range of technical expert working groups, as well as open consultation throughout the community of activity providers and other experts.*

*Further details of the creation of the Standard and Good Practice Guides can be found at [www.australianaas.org](http://www.australianaas.org).*

*It is intended that the Standard and GPG's will be regularly updated to reflect changing practice and better understanding over time. Updates will be noted on the website listed above.*

## 1.1 Activity

A Challenge Course is a temporary, mobile or permanent physical structure comprising of either an individual or series of **elements**, where a person requires a fall protection system should they fall from an element. A challenge course may include **slacklining** and activities at 'play centers' and 'climbing adventure centers'. A Challenge Course excludes structures or elements that involve abseiling, rock climbing, artificial surfaces climbing or **bouldering** (refer to the Abseil and Climb activity standard for these activities).

Challenge courses are also known as challenge ropes courses. **Participants** are required to use dexterity, strength, balance and complex physical movements to successfully traverse the element or course of elements. Challenge courses are often used for experiential learning, personal challenge or team building purposes but also for entertainment. **Adventure games** and **low obstacles** may also be a part of the challenge course.

Fall protection systems differ for **low elements**, **adventure games** and **high elements**.

**Low element(s)** (also known as low ropes or obstacle courses) is any element or series of elements for which the appropriate fall safety is achieved through **spotting** and/or an impact absorbing system. Some physical structures do not require fall safety and are called **low obstacles** to indicate when this is the case.

**Spotting** is a support process provided by a person, or persons, who offer physical protection of the head and upper body of a person should they fall.

**High element(s)** (also known as high ropes) is any element for which safety can no longer be achieved by spotting and requires a **belay system** using harnesses and specialist safety equipment or other established methods or systems. High elements may include but is not limited to swinging elements as well as flying foxes. In some circumstances spotting may be required while transitioning from a low to high fall height or visa-versa, as the 'stretch' in the belay system means it can only function as intended over a certain **fall height**.

An element is considered a **temporary element** when it remains in place no longer than seven consecutive days.

**Adventure games** are activities which are not identifiable as a low element or high element activity, but which require spotting to ensure participant safety. Adventure games may be conducted as separate activities or as part of a warm-up for challenge course activities. Adventure games are covered by this AAS.

## 1.2 Exclusions

Activities that are not covered by this AAS are:

- **Abseiling** either on **natural** or **artificial** surfaces (*refer [Abseiling and Rock Climbing GPG](#)*)
- **Bouldering** either on natural or artificial surfaces (*refer [Abseiling and Rock Climbing GPG](#)*)
- Games, sports or activities that are not **Adventure Games**

- **Rock climbing** either on **natural** or **artificial** surfaces (*refer Abseiling and Rock Climbing GPG*)
- Activities that do not involve a **belay system** (e.g. *mud runs, 'playground equipment', etc*)
- Competitive activities (e.g. *adventure races, etc.*)

### 1.3 Related activities

Possible related activities may include:

- Abseiling, Climbing or Bouldering either on natural or artificial surfaces (*refer Abseiling and Rock Climbing GPG*)
- Camping while on overnight or extended activities (*refer the Camping GPG*)

## 2- Management of risk

### 2.1 Management of risk

There are no additional specific activity provisions other than 'Core Good Practice Guide' Management of Risk provisions.

## 3- Planning

Refer Core Good Practice Guide – Activity Planning.

### 3.1 Activity plans

Additional challenge course activity planning considerations MAY include but are not limited to:

- site characteristics such as:
  - supervision line of sight
  - waiting areas
- element characteristics such as:
  - difficulty
  - height
  - belay system used
- leader competencies required
- activity proregression
- appropriate warm-up or lead-up activities (e.g. *trust, cooperation, communication*)
- suitable options to allow “challenge by choice”
- operating procedures and instructions that need to be provided
- participant training required (e.g. *spotting, belaying, attaching to safety systems*)
- any other relevant considerations listed in this document and the Core Good Practice Guide.

### 3.2 Emergency management planning

Refer Core Good Practice Guide – Emergency management planning.

The use of relevant rescue systems and procedures MUST be practiced periodically.

# 4-Participants

Refer [Core Good Practice Guide – Participants](#).

## 4.1 Information provided pre-activity

Pre-activity information SHOULD clearly communicate:

- expectations and activity conditions
- as per [Core Good Practice Guide – Participants](#).

An appropriate pre-activity assessment SHOULD be conducted to ensure participants have the necessary pre-requisite skills & knowledge to undertake the activity.

## 4.2 Participant considerations

Appropriate procedures MUST be in place to address risks associated with participants living with or experiencing an impairment.

Also refer [Core Good Practice Guide – Participants: Restrictions](#).

## 4.3 Participant health and wellbeing

Potential measures to assist in providing positive participant experiences MAY include but are not limited to:

- providing the activity as an option so it is ‘challenge by choice’
- providing a scaled level of experience to build participants level of skill, knowledge and experience
- providing real choice in terms of activity entry and exit options
- providing a briefing of hazards and risks and how these are managed
- considering the group dynamics when grouping participants
- providing emotional support through a supportive environment and positive rapport
- building and maintaining positive relationships within the group
- reducing as much as practical any discomfort from the equipment used.

# 5 – Environment

## 5.1 Environment and site related planning

For course and element details refer to [Equipment section ‘Artificial surfaces and elements design and construction’](#).

### 5.1.1 Challenge course environment considerations

Other environmental considerations other than climate or weather for challenge courses MAY include but is not limited to:

- the possible fauna at the challenge course
- the terrain surrounding the challenge course.

## 5.2 Course design and construction

Refer to [Equipment section ‘Artificial surfaces and elements design and construction’](#).

## 5.3 Weather

### 5.3.1 Weather information

Appropriate sources MUST be used for:

- current and forecast weather
- current and forecast weather warnings.

### 5.3.2 Severe weather

The following table details the:

- current Australian weather warnings
- associated weather for each warning
- mainland warning trigger points for issuing warnings for strong winds and hail.

Bureau of Meteorology weather warnings and associated weather Table:

Severe Weather Warning	Severe Thunderstorm Warning	Coastal Waters Wind Warning	Tropical Cyclone Advice: Watch or Warning
High tides			
Large surf			
Blizzards			
Heavy rain/flash flooding	Heavy rain/flash flooding		
Strong winds Wind >63 km/h Gusts >90 km/h	Strong winds Gusts >90 km/h	Strong winds Wind >48 km/h or >26 knots	Strong winds Wind >62 km/h or >=34 knots
	Tornadoes		
	Hail (>=2cm)		
	Lightning		

### 5.3.3 Weather triggers

Trigger points MUST be based on relevant Bureau of Meteorology weather forecasts and warnings and actual weather conditions.

The risk management plan and emergency management plan SHOULD include guidance on trigger points and associated actions for:

- wind speeds or wind gusts that make the course or element(s) unsuitable for use
- weather conditions that limit visual/verbal direct supervision
- lightning
- severe weather warnings
- thunderstorm warnings
- tropical cyclone advice: watch and warning
- cold temperature
- extreme hot temperatures.

Actions for weather triggers MAY include but are not limited to:

- cancellation of activity
- postponing the activity
- modifying the activity
- evacuating to a safe location
- avoid locations effected by tides or surf
- avoiding areas that have the potential for flash flooding
- preparations to avoid the risks associated with lightning

- preparations to avoid the risks associated with blizzards
- moving to areas that are protected from strong winds and/or hail
- managing risks of flying or falling items during strong winds.

#### 5.3.4 Lightning

Whilst thunder is audible groups SHOULD avoid:

- being on high elements
- being in unsuitable locations.

When thunder is audible, a suitable location SHOULD be sort, to wait out the thunder storm.

Considerations for locations to waiting out the thunder storm SHOULD include but not limited to avoiding:

- being on high elements
- being connected to metal structures, cable or equipment
- being on the highest ground in the area
- tall trees or structures that may act like a lightning rod
- water saturated ground near watercourses
- locations where group is unable to spread out.

### 5.4 Bushfire, prescribed fire and fire danger

Refer *'Core Good Practice Guide' section - Bush fire, prescribed fire and fire danger.*

### 5.5 Flooding

Areas subject to flooding or flood warnings SHOULD be avoided.

Areas likely to experience **flash flooding** SHOULD be avoided during severe weather or thunderstorms.

### 5.6 Wildlife safety

Procedures SHOULD be in place to minimise the risks associated with any fauna or flora that MAY be encountered.

The types of wildlife encounters that MAY need to be considered include but is not limited to:

- snakes
- ants
- bees
- wasps
- nesting birds
- other local fauna.

### 5.7 Tree safety

Refer the Equipment sections - 'Construction' and 'Inspection & maintenance' regarding requirements relating to courses or element(s) using trees as part of their structure.

Weather based trigger(s) as to when to avoid operating activities in or below trees SHOULD be established.

Where element(s) are located or the activities are regularly conducted under trees, a risk assessment of the trees by an appropriately **competent** person MUST be completed periodically.

### 5.8 Environmental sustainability procedures

Also refer *Core Good Practice Guide – Environmental sustainability procedures.*

### 5.8.1 Design and construction environmental sustainability

For considerations refer to AS 2316.2.1:2016 Artificial climbing structures and challenge courses Part 2.1: Flying foxes and challenge ropes courses—Construction and safety requirements (EN 15567-1:2007, MOD).

### 5.8.2 Temporary elements environmental sustainability

Refer design and construction section above.

### 5.8.3 Sustainability procedures

The **procedures** MAY include but is not limited to procedures listed in 'Core Good Practice Guide' Environmental sustainability and the following:

#### 5.8.3.1 Travel and camp on durable surfaces

Travelling in an area on durable surfaces MAY include but is not limited to:

- Utilise recognised tracks to approach and move within the challenge course
- Locate waiting areas that have a firm base and can tolerate groups without causing vegetation damage and erosion
- Actively managing participants to minimise trampling and damage to the surrounding vegetation
- Utilise temporary erosion control or vegetation protection measures in heavy traffic areas around elements.

#### 5.8.3.2 - Leave what you find

Leave what you find MAY include but is not limited to:

- Rope protectors or slings SHOULD be used to protect trees or other vegetation if used for belay points
- Steps SHOULD be taken to prevent soil compaction around the roots system of living trees

#### 5.8.3.3 - Be considerate of your hosts and other visitors

Be considerate of your hosts and other visitors MAY include but is not limited to:

- Locate equipment, active participant(s) and participants non-actively participating so they allow free access to tracks
- Encourage quiet communication to minimise the noise.

## 6- Equipment and logistics

### 6.1 Artificial surfaces and elements – design and construction

Construction and/or operation of challenge courses MUST conform with any legislative or regulatory requirements of the relevant jurisdiction(s) the activity operates in. (For example, 'amusement' structure laws.)

Permanent artificial surfaces and element(s) constructed specifically for use in activities MUST comply with relevant construction standards.

The relevant standard MAY include:

- AS 2316.2.1:2016 Artificial climbing structures and challenge courses Part 2.1: Flying foxes and challenge ropes courses—Construction and safety requirements (EN 15567-1:2007, MOD)
- AS 3533.1-2009: Design and construction
- AS 3533.1-2009/Amdt 1-2011: Design and construction
- AS 3533.2-2009: Operation and maintenance
- AS 3533.2-2009/Amdt 1-2011: Operation and maintenance
- AS 3533.3-2003: In-service inspections]

- AS/NZS 4422:1996 Playground surfacing— Specifications, requirements and test method
- EN 795: Personal fall protection equipment – anchor devices

Permanent **artificial surfaces** and **element(s)** constructed using superseded construction standards SHOULD be reassessed for ongoing suitability for use during maintenance inspection.

Temporary **artificial surfaces** and/or **temporary element(s)** SHOULD comply with either permanent artificial surfaces relevant requirements or be assessed by a competent person that it is fit for purpose for the activity.

Design of high element(s) and challenge courses SHOULD allow for participant rescue.

Systems MUST have a 'functional inspection' to confirm it is appropriately constructed and operates or performs it's required function. Refer [Appendix A5 – Inspections & maintenance](#) for additional detail.

## 6.2 Equipment general

### 6.2.1 Equipment general principles

All equipment MUST be used with reference to the manufacturers' instructions.

Training in the use of equipment used MUST be provided to activity leaders and participants.

Before use, the compatibility between and correct functioning of all equipment MUST be confirmed.

The elements used MUST be of a height that the fall height will allow the fall safety system to operate effectively.

Operation of challenge courses MUST conform with any legislative or regulatory requirements. (*For example, 'amusement' structure laws.*)

Equipment, connection methods and systems used MUST be periodically reviewed.

Equipment used MUST be appropriate for the activity context.

Equipment listed below MUST be manufactured for use in the context of the activity:

- Accessory cord
- Artificial fixed anchors used in elements
- Ascending devices
- Belay devices
- Cables, wires and other fixed ropes
- Carabiners or other connectors
- Descending devices
- Dynamic rope
- Harnesses
- Helmets
- Lanyards
- Pulleys
- Slings
- Static rope
- Any other equipment relied upon for safety systems.

### 6.2.2 Equipment loading

Equipment will have a **stated strength** that MAY or MAY NOT include a **safety factor**. The type of **stated strength** rating needs to be known before use to ensure equipment is safely loaded. (Refer [Appendix 3 – Equipment load ratings](#) for more details).

Equipment with the **stated strength** providing the **Minimum Breaking Strength (MBS)** MUST have a suitable **safety factor** applied and a **Safe Working Load (SWL)** calculated.

Equipment with the **stated strength** providing the **Safe Working Load (SWL)** MUST be loaded only to a maximum of the **Safe Working Load (SWL)**.

Reference to the manufacturers' instructions MUST occur when determining a **safety factor** and/or **safe working load**.

The expected peak load and possible additional loads if a rescue be carried out MUST be considered when determining equipment loading.

### 6.2.3 Smoking

There MUST be no smoking near and/or while wearing safety equipment.

## 6.3 Fall safety management systems

### 6.3.1 Fall systems

All safety equipment used in the safety management system and/or a belay system MUST be appropriate for the task.

An appropriate safety system MUST be used when at height on all **high elements**.

Procedures used for **belay systems** MUST be suitable for the equipment.

Procedures and systems used SHOULD be consistent throughout the challenge course activity session.

Any **belay system** or lanyard MUST be appropriate for the expected **fall factor** of a climber.

Also refer [Leadership – Supervision of belay systems](#) section.

### 6.3.2 Ropes and lanyards use

The type of rope used in a **belay system** MUST be appropriate for the type of **high element**.

Considerations for selecting when **dynamic rope** or **static rope** is suitable for a belay system SHOULD include but is not limited to:

- the expected fall distance before the belay system halts the fall
- the amount of impact loading expected on the **climber**
- the **fall factor** involved
- if the elasticity of a **dynamic rope** during a fall may increase the risk of injury
- the amount of slack rope likely to be in the **belay system**, which may increase the fall distance and therefore the impact loading on the climber and **fall factor**.

Safety lanyards MUST be made of a suitable material (*e.g. flat webbing, tubular webbing, static or dynamic rope of suitable diameters*) that has an appropriate **safe working load**.

### 6.3.3 Connections

The connection system used MUST always provide an appropriate safe attachment, including at changeover/transition points.

Connection methods, equipment and systems used MUST be periodically reviewed.

Considerations when determining connection methods, equipment and systems MUST include:

- the type of equipment being used
- what systems is any are required to provide redundancy
- what needs to be attached and how
- the experience and context of who is completing the connection

- the availability of a **competent person** to supervise or check the connection that is completed by a participant.

#### 6.3.4 Connectors – practices relating to use

The type of **connector** used MUST be suitable for the task.

**Connectors** made from appropriate materials MUST be used when used to connect to metal cable.

**Carabiners** MUST be used so that no load is intentionally across the minor axis or gate.

Systems that have loads applied and release so that alignment of **connectors** or equipment may change, or subject to vibration SHOULD be inspected at an appropriate frequency.

#### Harness connections

The connection of the harness MUST use:

- an appropriate knot to tie in or
- two methods of connection to provide redundancy, with any carabiners used being **locking carabiners** or
- a ‘three way’ **auto-locking** carabiner where ‘clipping in’ is the sole means of attachment or
- an appropriately tied girth hitch or
- a **tool locked** connector.

The connection of the belayers harness to a ‘belay device’ MUST use either a **locking** carabiner or **auto-locking** carabiner.

In situations where participants complete any connection to a harness:

- the connector or knot MUST be checked by a **competent person**
- and when a **competent person** MAY not check the connection, two methods of connection to provide redundancy MUST be used.

#### Belay lines & lanyards connections

The connection attaching climbers to any belay points or lines MUST use:

- an **auto-locking** carabiner or
- an **interlocking device** or
- a **tool locked** connector.

#### 6.3.5 Harnesses

Where required an appropriate harness MUST be used on all **high elements**.

Harnesses SHOULD be a full body harness or a combination chest and sit harness.

##### 6.3.5.1 Full body harness & chest harnesses

Chest harnesses MUST only be used in combination with a sit harness.

Consideration of the use of a full body harness or combination chest and sit harness SHOULD occur:

- for flying foxes and giant swings
- when inversion is intended or likely
- when the security of a sit harness cannot be relied upon due to body shape of the participant
- when the security of a sit harness cannot be relied upon if the person were to experience a pre-existing health, medical or personal condition episode (*e.g. epilepsy*)
- for the very young
- length of time in harness and positioning (*e.g. extended time periods at height*)
- law or regulatory requirements.

### 6.3.6 Rescue equipment

Appropriate vertical rescue equipment **MUST** be readily accessible.

Vertical rescue equipment **MAY** include but is not limited to:

- ascending device(s)
- belay device(s)
- carabiners (alloy/steel)
- 'claws'
- knife
- pulleys
- prusik loops
- pair of pliers or multi-grips
- rescue rope equivalent in length to greater than twice the height of the highest element or belay wire or anchor point **SHOULD** be accessible and available for rescue
- slings
- relevant tools for opening devices or connectors
- lanyards.

Example equipment lists can be found in [Appendix 1 – Challenge course equipment](#).

### 6.3.7 Assisted belay

Refer to sections above: [falls systems](#), [ropes and lanyards use](#), [connectors](#), [harnesses](#) and [rescue equipment](#).

### 6.3.8 Self-belay including continuous self-belay

Also refer to sections above: [falls systems](#), [ropes and lanyards use](#), [connectors](#), [harnesses](#) and [rescue equipment](#).

#### 6.3.8.1 Self-belay system with two safety lanyards

**Self-belay** systems with two safety lanyards **MUST** be designed to minimise possible user entrapment pressure on the neck and/or head and eliminate possible strangulation by:

- either having unequal lanyard lengths so in the event of a fall, one lanyard is loaded and the second lanyard remains loose even if both are attached to the belay anchoring system OR having sufficient gap between the two lanyards (*example a) both lanyards are held apart by a 'rigid spreader' or b) the lanyards are attached to separate attachment points on the harness*) so even if both are loaded, entrapment between the lanyards does not occur
- each separate lanyard is constructed so it forms a 'single piece' of material that does not form a loop that creates an entrapment hazard. (*Example a) interlocking device lanyards are appropriately sheathed to prevent individual components creating a 'loop entrapment hazard', while b) a lanyard created from material (e.g. webbing) tied into a loop would create a 'loop entrapment hazard' must not be used*).

**Self-belay** systems with two safety lanyards **SHOULD** be designed to minimise possible user entrapment pressure on the neck and/or head and eliminate possible strangulation by:

- having the point at which both lanyards join together or are separated by a 'rigid spreader', located at a distance when under load, it sits below the height of the climber's neck, so in the event of a fall, the weight of the climber is supported by their harness and the climber cannot be trapped by the neck in the join or by the 'rigid spreader'. (*Example a) the join or spreader forms a "Y" at the climber's belly/chest level due to the short length between harness attachment and where the "Y" occurs, b) the join or spreader forms a "Y" located at the climber's face level or higher, so in a fall the Y could trap the climber's neck and the climber's weight take by the neck rather than the harness and should be avoided.*)

Refer [Appendix 6 Safety diagrams](#) for additional clarification.

The effective minimum difference in length between the two unequal lanyards, taking into account the connectors being used **MUST** be sufficient to alleviate the risk of entrapment.

Where two unequal length lanyards are not used, the minimum 'rigid spreader' or gap distance between the lanyards harness attachment points **MUST** be sufficient to alleviate the risk of entrapment.

Any 'rigid spreader' used for alleviating the risk of entrapment **MUST** be:

- of an appropriate design and material to operate as intended AND
- have a safe working load suitable for the task.

While progressing across an element while using a two-safety lanyard system, both lanyards of the **self-belay** system **SHOULD** be attached to the belay anchoring system.

### 6.3.9 Collective safety systems

**Collective belay** systems **MUST** have a 'functional inspection' to confirm it is appropriately constructed and operates or performs its required function.

#### 6.3.9.1 Soft-fall

**Soft-fall** used to protect from falls from height **MUST** conform to AS2316.1—2009 – Part 1—2009 Artificial climbing structures and challenge courses Part 1: Fixed and mobile artificial climbing and abseiling walls.

Where **soft-fall** is relied upon without the use of **spotting** it **MUST** cover the whole of the expected **fall zone**.

#### 6.3.9.2 Barriers

Any barriers, railings or banisters to protect from a fall from height **MUST** conform to relevant building code(s).

#### 6.3.9.3 Deep Water

Any deep water "pools" used to protect from falls of height **MUST** conform with any required 'pool safety' legislative or regulatory requirements of the relevant jurisdiction(s) the activity operates in.

Deep water to protect from falls of height **MUST** cover the whole of the **fall zone**.

The depth of water used to protect from falls of height **MUST** be sufficient so a person who falls unprepared avoids hitting the bottom. (*For example, deep enough if they fall and 'pin drop'.*)

The fall height into deep water used to protect from falls of height **MUST** be limited to protect a person falling from injury.

The "pool" **MUST** allow suitable entry and exit from the water.

The "pool" **MUST** have any required infrastructure to manage access (e.g. fencing and gates to prevent accidental child drownings etc.)

The water within the pool **MUST** be suitable for a person to swim in.

#### 6.3.9.4 Safety netting

Nets used to protect from falls from height MUST conform to:

- BS EN 1263-1:2014 Temporary Works Equipment – Safety Nets – Part 1: Safety Requirements, Test Methods
- BS EN 1263-2:2014 Temporary Works Equipment – Safety Nets – Part 2: Safety Requirements For The Positioning Limits.

#### 6.3.10 Participant supplied safety equipment

Where a **participant** supplies any personal safety equipment, this MUST comply with this AAS and be appropriate and serviceable.

A procedure regarding **participant** supplied safety equipment SHOULD be developed.

#### 6.3.11 Spotting belays

Refer [Supervision - Spotting low elements and adventure games](#)

Refer [Supervision - Participants belaying and spotting](#)

### 6.4 Other equipment

#### 6.4.1 Helmets

A risk assessment MUST determine when **active participant(s)** are required to wear a helmet.

A risk assessment MUST determine if anyone **non-actively participating** is required to wear a helmet.

Considerations for wearing a helmet MUST include risks:

- of head injury from fall objects
- of strangulation by the helmet strap caused by helmet 'entrapment'
- of head injury from striking the head during falls or swings.

When a helmet is required to be worn it MUST be an appropriate helmet for the situation.

Area(s) and activities that require a helmet to be worn MUST be identified.

A helmet SHOULD be worn while climbing on high elements.

A helmet SHOULD be considered when climbing on low elements.

Also refer to [Leadership – Entanglements](#)

#### 6.4.2 Clothing

Procedures MUST be in place to ensure appropriate clothing is worn.

Considerations when determining appropriate clothing include but is not limited to:

- the requirements of the element(s) being used
- sun protection
- the weather conditions.

Footwear MUST be fit for purpose.

Procedures MUST be in place to ensure appropriate footwear for the expected and foreseeable terrain is used.

Also refer to [Leadership – Entanglements](#)

#### 6.4.3 Other personal equipment

Procedures MUST be in place to ensure a suitable drinking water supply is available.

## 6.5 Pre-activity equipment preparation

### Safety inspection

All equipment **MUST** be checked that it is serviceable before each activity or before being used.

Consideration **SHOULD** be given to implementing checks for damage in situations where unsupervised community access to equipment or elements could occur (*e.g. public access sites, vandalism, etc*).

### Pre-activity course preparation

A **belay system** **MUST** be used when undertaking pre-activity setup that has a falling from height hazard.

When a **belay system** is used, there **MUST** be another person:

- aware that the **belay system** is in use
- monitoring the activity (*e.g. level 2 or 3 supervision*)
- who can promptly respond if there is an emergency.

## 6.6 Inspection and maintenance

Maintenance inspections **MUST** conform with any legislative or regulatory requirements.

Compliance with the AS 2316.2.1:2016 Australian Standard **MAY** include but is not limited to inspection, testing and maintenance requirements.

All elements and anchors used **MUST** be periodically inspected by an appropriately competent person, as per any relevant construction standard, designer and/or constructor recommendation(s).

Appropriate procedures **MUST** be in place for inspections and determining the time periods between inspections.

Considerations for how regular the assessment occurs **MAY** include but is not limited to:

- the characteristics of the site
- how many people use the site and how regularly
- any manufacturer's, designer's or constructor's recommendations where relevant
- the equipment being used.

Any tree used as part of element(s) **SHOULD** be periodically inspected by an appropriately **competent person** such as an arborist.

Any tree located within the challenge course area that presents a fall object risk **SHOULD** be periodically inspected by an appropriately **competent person** (*e.g. arborist*).

All equipment **MUST** be inspected periodically that it is serviceable.

Inspections **SHOULD** include but is not limited to:

- Surrounding area and ground
- Physical structures
- Materials and fittings
- Safety equipment.

Equipment and inspection records **MUST** conform with any legislative or regulatory requirements.

A record of inspection **MUST** be maintained.

Refer [Appendix 5 – Inspections & maintenance](#) for additional detail.

An equipment record **SHOULD** be maintained.

Where used an equipment record SHOULD record but is not limited to the:

- item individual identifier
- date of purchase
- date of inspections
- recommended or maximum lifespan.

A retirement of equipment policy SHOULD be developed.

Considerations for a retirement of equipment policy MAY include but is not limited to:

- type of use
- frequency of use
- prevailing conditions when used
- actual deterioration, wear and tear
- age
- years in service
- manufactures recommendations.

A system to identify equipment and elements SHOULD be used to assist reporting and recording faults or condition checks.

## 6.7 Storage of equipment

Activity equipment MUST be stored in accordance with the manufacturer's recommendations or instructions.

Where no manufacturer's recommendations exist, considerations for storage of equipment MAY include but is not limited to:

- equipment is clean and dry
- the storage is free from harmful chemicals
- the storage is free from damp conditions
- the storage is free from environmental exposure including Ultra Violet (UV) light and avoids extremes of temperature

# 7- Leadership

## 7.1 Conventions used

### 7.1.1 Level of supervision

A system to describe the different **levels of supervision** MUST be used. (*See an example system below.*)

Supervision used can be described by the "level of supervision". This document uses the following three **levels of supervision**:

- **Level 1** – where a nominated person responsible for supervising others during all or part of the activity is able to physically intervene immediately. (Aligns with level 1 in AS 2316.2.2:2016 and direct supervision in the Core GPG).
- **Level 2** – where a nominated person responsible for supervising others during all or part of the activity is able to visually see the participant(s) and verbally intervene immediately. (Aligns with level 2 as per AS 2316.2.2:2016 and direct supervision in the Core GPG).

- **Level 3** – where a nominated person responsible for supervising others during all or part of the activity is in the vicinity and able to respond promptly to provide assistance when called upon. (Aligns with level 3 as per AS 2316.2.2:2016 and indirect supervision in the Core GPG).

### 7.1.2 Leader naming conventions

The activity leader naming convention enables this activity Good Practice Guide to be related to Core Good Practice Guide requirements.

The leadership naming conventions for challenge course activities are:

- “Manager” and “Supervisor” is equivalent to Leader in Core Good Practice Guide.
- “Instructor” is equivalent to Assistant leader in Core Good Practice Guide.
- “Activity leader” is a collective noun referring to conductor(s), supervisor(s) and/or manager(s).

#### **Instructor**

Instructor (also known as a conductor): A person with the competence to supervise participants who are actively participating on challenge course element(s). An instructor MAY be a challenge course instructor: low elements and/or an instructor: high elements.

The competence of an instructor generally means that they:

- require defined operating procedures to follow when supervising participants
- require **Level 3** supervision by a supervisor or manager so that assistance is readily available if a non-routine situation arises
- guide participants but there is no intention of imparting activity skills or knowledge to participants beyond that which is necessary to enable their safe participation, although the conduct of the activity MAY achieve other education outcomes.

#### **Supervisor**

Supervisor: A person with the competence to independently supervise participants who are actively participating in challenge courses or elements. A supervisor MAY be a challenge course supervisor: low elements and/or a supervisor: high elements.

The competence of a supervisor generally means that they:

- do not require supervision when supervising participants use of element(s)
- can apply their skills and knowledge to a broad variety of challenge courses and elements
- can provide **Level 1, 2 or 3** supervision of instructor(s)
- are able to deal with non-routine situations
- are able to teach the skills and knowledge required to conduct activities (i.e. able to train instructors).

#### **Manager**

Manager: A person with the competence to be a supervisor and to manage and maintain a challenge course. A manager MAY be a challenge course manager: low elements and/or a manager: high elements.

The competence of a manager generally means that they:

- can undertake all necessary activities related to a challenge course including supervisor roles
- can provide **Level 1, 2 or 3** supervision to instructors and supervisors
- undertake or manage the maintenance of the course or elements.

## 7.2 Competencies

This section outlines the **competencies** that activity leaders **SHOULD** have.

### 7.2.1 Competencies overview

The Australian Adventure Activity Standard and Good Practice Guides refers to units from the Sport, Fitness and Recreation Training Package for descriptive statements of the knowledge and skills required of **activity leaders**.

The Training Package units are used for the sole purpose of providing descriptions for the knowledge and skills required. It is not intended to imply or require that specific formal training, assessment or qualification is the only means of gaining or recognising knowledge and skills.

**Providers CAN** recognise **activity leaders** as having the 'ability to apply knowledge and skills to achieve expected results' (i.e. **competencies**) in a number of different ways as detailed in 'Core Good Practice Guide' Recognition of competence.

The Training Package units listed can be found by searching for the units on the [training.gov.au/Home/Tga](http://training.gov.au/Home/Tga) website. The code provided with the unit name assists in this search.

### 7.2.2 Challenge course competencies

Also refer to competencies section in 'Core Good Practice Guide'.

The following table outlines the recommended **competencies activity leaders SHOULD** have when leading challenge courses.

Activity type	Instructor Units describing skills and knowledge	Code (or equivalent)	Supervisor Units describing skills and knowledge	Code (or equivalent)	Manager Units describing skills and knowledge	Code (or equivalent)
<b>Common challenge course units</b>						
	Operate communications systems and equipment	PUAOP013A	Operate communications systems and equipment	PUAOP013A	Operate communications systems and equipment	PUAOP013A
			Plan for minimal environmental impact	SISOOPS304A	Plan for minimal environmental impact	SISOOPS304A
<b>Low elements/ Adventure games</b>						
	All units listed in Part I – Core Standard, all common challenge course units plus		All units listed in Part I – Core Standard, all common challenge course units plus		All units listed in Part I – Core Standard, all common challenge course units plus	
	Conduct a low ropes session	SISOCR301A	Conduct a low ropes session	SISOCR301A	Conduct a low ropes session	SISOCR301A
			Supervise a low ropes session	SISOCR403A	Supervise a low ropes session	SISOCR403A
					Manage a low ropes course	SISOCR505A
			Manage risk in an outdoor activity	SISOODR404A	Manage risk in an outdoor activity	SISOODR404A
			Coordinate emergency responses	SISXEMR402A	Coordinate emergency responses	SISXEMR402A

Activity type	Instructor Units describing skills and knowledge	Code (or equivalent)	Supervisor Units describing skills and knowledge	Code (or equivalent)	Manager Units describing skills and knowledge	Code (or equivalent)
<b>High elements</b>						
	All units listed in Part I – Core Standard, all common challenge course units plus		All units listed in Part I – Core Standard, all common challenge course units plus		All units listed in Part I – Core Standard, all common challenge course units plus	
	Conduct a high ropes session [Note: has limited rescue skills]	SISOCR302A	Conduct a high ropes session	SISOCR302A	Conduct a high ropes session [Note: advanced rescue skills]	SISOCR302A
			Supervise a high ropes session [Note: has advanced rescue skills]	SISOCR404A	Supervise a high ropes session	SISOCR404A
			Manage risk in an outdoor activity	SISOODR404A	Manage risk in an outdoor activity	SISOODR404A
			Coordinate emergency responses	SISXEMR402A	Coordinate emergency responses	SISXEMR402A
			Implement and monitor occupational health and safety policies	SISXOHS402A	Implement and monitor occupational health and safety policies	SISXOHS402A
					Manage a high ropes course	SISOCR506A
<b>Facilitation skills</b>						
	Assist in the facilitation of adventure-based learning activities	SISOABL301A	Assist in the facilitation of adventure-based learning activities	SISOABL301A	Assist in the facilitation of adventure-based learning activities	SISOABL301A
			Facilitate adventure-based learning activities	SISOABL402A	Facilitate adventure-based learning activities	SISOABL402A

Note: Refer to [Abseiling and Climbing GPG](#) for:

- **Bouldering** on **natural** or **artificial** surfaces
- **Abseiling** and **climbing** elements on **natural** or **artificial** surfaces.

## 7.3 Recognition of competence pathways

Refer to considerations for recognition pathways outlined in '[Core Good Practice Guide](#)' - *Competencies*.

## 7.4 Supervision requirements

### 7.4.1 Supervision plan

Supervision requirements **MUST** be documented in a challenge course supervision plan.

Activity supervision **MUST** be implemented according to the challenge course supervision plan.

A challenge course supervision plan **MUST** include:

- A course diagram for visual reference
- A summary of the risks identified in the risk assessment
- Supervision requirements for the challenge course
- Specific locations to operate supervision from

- Obstructions (e.g. trees, structures, etc.) and/or conditions (e.g. sun location, mist, etc.) that may impact supervision visibility and procedures to overcome these
- Relevant manufactures specifications or requirements
- Activity leader roles and responsibilities
- Activity leader competencies including any special competencies for each element
- Activity leader pre-deployment confirmation of competence, training or orientation required
- Communications plan
- Emergency response plan.

Also refer [Appendix 7 – Challenge course supervision plan](#).

#### 7.4.2 Group size considerations

Considerations when determining group size MUST include:

- site capacity
- site related legislation or regulation
- the time allowed to enable all participants in the group to complete the activity is sufficient and realistic and does not compromise safety
- having appropriate supervision for participants **non-actively participating**
- considerations for determining group size outlined in [Core Good Practice Guide](#).

#### 7.4.3 Supervision ratios considerations

Considerations in determining challenge course supervision requirements SHOULD include but are not limited to:

- the nature and design of the **elements**
- requirements for the **belay system(s)** and transfer between belay system(s)
- time for the **activity leaders** to allow all participants to undertake the activity being sufficient and realistic and does not compromise safety
- the ability to see and/or hear **active participants**
- the number of **active participants** enables activity leaders to adequately monitor, detect and correct improper procedures
- having appropriate supervision for participants non-actively participating
- the potential for **activity leader** fatigue
- emergency event and/or rescue requirements
- considerations for determining supervision requirements in [Core Good Practice Guide](#).

An appropriately **competent person** MUST establish supervision requirements and standard operating procedures for element(s) and/or the challenge course.

#### 7.4.4 Participants that are non-actively participating

Consideration MUST be given to the type of supervision participants required when **non-actively participating** (i.e. who are waiting to undertake the activity).

In cases where participants who are **non-actively participating** require **Level 1 or 2** supervision, that supervision MUST be provided by an **activity leader** not providing **Level 1 or 2** supervision of an activity OR by a **responsible person** as appropriate.

#### 7.4.5 Assessment of participants use of safety systems

Each **participant** MUST be assessed to confirm they have sufficient reach to use and operate the safety systems while retaining an appropriate footing. (For example, there may be a minimum height requirement to reach or connect belay systems.)

An assessment MUST be completed to confirm each **participant** is competent to carry out the relevant safety instructions and safety system operation.

The assessment to confirm each **participant** is **competent** to carry out the relevant safety instructions and safety system operation **MUST** be completed without exposure to risks, serious injury or death. (*For example, use of test system or element.*)

Where the **participant** has been assessed as **competent** to carry out the relevant safety instructions and safety system operation, ongoing supervision **MUST** monitor and check the participants actual use of the safety system for at least 5 times before adjusting the **level of supervision**. (*For example, a self-belay interlocking system being used is supervised to ensure the first 5 actual uses after confirming competence using the text system or course.*)

#### 7.4.6 Overall supervision

When **high elements** are in use there **MUST** be at least one **activity leader** available with supervisor or manager competencies.

All people at height irrespective of the level **competence** **MUST** be appropriately supervised and/or monitored.

Supervision for **collective belay** systems **MUST** be determined by risk assessment and supervision plan.

The maximum number of separate elements one **activity leader** can supervise **MUST** be determined by risk assessment and supervision plan.

When **high elements** are in use there **SHOULD** be a minimum of two **activity leaders** available.

#### 7.4.7 Connectors & connection

**Self-closing connectors** that are **non-locking** **MUST** not be used.

All **locking** connectors that are not **tool locked** or **auto-locking** (*e.g. screwgate carabiners*) **MUST** be appropriately supervised throughout the activity to ensure they remain locked.

The first/initial connection of **climbers** and **belayers** to the safety system **MUST** be supervised or checked before being relied upon. (Refer Leadership - Assessment of participants use of safety systems above.)

#### 7.4.8 Supervision for different situations

To be used in conjunction with Leadership – Supervision requirements sections above.

The recommended level of supervision, minimum recommended usage checks and suggested supervision ratios that **SHOULD** be used are in the following table.

(See table next page)

**Supervision for different situations table**

Safety system	Assessment	Checking use after assessment (Refer note 1 and 3)	Rest of the system (Refer note 1 and 3)	Suggested ratio (Refer to note 1 and 2)
Low elements or adventure games	Level 1	Level 1 or 2 as appropriate	Level 2 thereafter when <b>spotting</b> required	1:18 active participants with a maximum of 8 climbers
			Level 3 (see note 7) thereafter when no <b>spotting</b> required	1:24 active participants
Assisted or team belay (Note 5)	Level 1	Level 1 check each use	Level 1 check each use	1-4 belay systems (Note 4)
Auto belay	Level 1	Level 2 with a minimum of 3 uses checked	Level 2 thereafter	1:12 climbers
Self-belay	Level 1	Level 2 with a minimum of 5 uses checked	Level 2 thereafter if connectors are: <ul style="list-style-type: none"> <li>• <b>auto-locking</b> or</li> <li>• <b>triple action auto-locking</b></li> </ul>	1:12 climbers
			Level 3 (see note 6) thereafter if connectors are: <ul style="list-style-type: none"> <li>• <b>tool locked,</b></li> <li>• <b>interlocking device</b> or</li> <li>• <b>interlocking device - tool activated</b></li> </ul>	1:15 climbers
Continuous self-belay	Level 1	Level 2 with a minimum of 3 uses checked	Level 3 (see note 6) thereafter if connectors are: <ul style="list-style-type: none"> <li>• <b>tool locked,</b></li> <li>• <b>interlocking device</b> or</li> <li>• <b>interlocking device - tool activated</b></li> </ul>	1:18 climbers

**Notes:**

1. Use course designers or course builders recommendations for the site and/or elements when available. Site specific recommendations **MUST** be used in preference to generic suggestions that lack an understanding of the specific site or element involved.
2. When site specific course designers or course builders ratio recommendations are not available, the suggested ratios in the table need to be revised for the specific site or elements by considering:
  - Leadership - Overall supervision section requirements and recommendations above and
  - Leadership - Group size considerations section above and
  - Leadership - Supervision ratio considerations section above.
3. When site specific course designers or course builders' levels of supervision and assessment checking recommendations are not available, the suggested assessment checking recommendations in the table need to be revised for the specific site or elements.
4. An important consideration in determining the supervision ratio include but is not limited to the proximity of the belay stations.
5. Includes all other types of safety systems not specified elsewhere (*e.g. haul systems, "donkey belays", "glider possum" etc.*)
6. Use of **Level 3** supervision on high elements **MUST** only be used where the course has a suitable design and equipment and appropriate procedures for participant induction, assessment and progress monitoring.
7. Use of **Level 3** supervision for low elements or adventure games when no spotting required **MUST** only be used where the course or adventure game is of appropriate design for the participants.
8. Refer glossary for definitions for **levels 1, 2 or 3**.

## 7.6 Activity management

### 7.6.1 Knowledge of site

Activity leaders **MUST** have an induction to the activity site that includes supervision requirements in the supervision plan and any relevant specific activity site procedures.

The knowledge of the activity site that activity leaders require before leading participants at that site, **SHOULD** be considered when allocating activity leader roles.

### 7.6.2 Activity leader positioning

Procedures **SHOULD** enable **activity leaders** to respond to emergencies and complete rescues in an appropriate time frame.

### 7.6.3 Participants belaying and spotting

Considerations for when **participants** operate **belay systems** **MUST** include:

- **participants** are willing and capable
- appropriate training is provided
- the need for ongoing monitoring to ensure:
  - correct technique is used
  - attention to the task is maintained
  - equipment is used correctly
- backup systems to support the belayer (e.g. using a backup belayer)
- the relative weights between the belayer and climber, where the belayer's weight is integral to the correct function of the belay and the belayer is not anchored.

Considerations for when participants are spotting **SHOULD** include but are not limited to:

- **participants** are willing and capable
- appropriate training is provided
- the need for ongoing monitoring to ensure:
  - correct technique is used
  - attention to the task is maintained.

### 7.6.4 Activity information for participants

The information required **MUST** be determine prior to the activity.

Required information **MUST** be provided at the appropriate time before or during the activity.

Activity information that **SHOULD** be provided to **low element** or **adventure game** participants includes but is not limited to:

- appropriate personal clothing requirements
- relevant hazards and risks
- any expectations required of the participant
- specific areas they need to know about (*e.g. waiting areas, belay areas, where safety equipment is to be worn, areas not to be entered*)
- how to access the elements
- communications and systems used to manage the flow and safety of the activity
- the correct fitting of and care of any personal safety equipment
- appropriate technique(s) for the activity
- method for "falling off" and "recovering"
- correct method of **spotting**.

Activity information that **SHOULD** be provided to high element participants includes but is not limited to:

- information provided for **low element** or **adventure game** participants above

- element specific hazards or risks
- the correct use of the **belay systems** and/or any other fall protection systems
- appropriate technique(s) for the activity
- the release procedures for belay system or other system
- procedures for exiting or being lowered back down.

Where there is only has one **activity leader**, the group MUST be briefed on what action to take to enact the emergency management plan if the activity leader becomes injured or incapacitated.

### 7.6.5 Activity Communications

A clear & unambiguous communication system MUST be used to manage the activity.

For example:

- system or safety operation such as confirming “on belay” or “off belay”
- safety communication from leader to participant, leader to leader or leader to supervisor
- safety communication participant to participant
- emergency situations.

### 7.6.6 Falls from height

Considerations for the likelihood of a fall from height SHOULD include but are not limited to:

- the stability and grip of the surface being stood on
- obstacles that need to be negotiated
- abilities of participants including the ability to follow instructions.

To protect from a fall from height, procedures MUST include checking participant(s):

- equipment is correctly fitted before they need to rely on the belay system
- correct attachment to the belay system, safety or other systems.

Checking equipment and attachment MUST not be delegated to the participants themselves, unless they have demonstrated competence in the procedure(s) and then only for checking their own equipment or attachment.

To reduce the potential for falls from height, procedures MUST include:

- ensuring ropes are of a sufficient length for the element
- remove unnecessary slack in belay system before use
- monitoring the correct use of belay systems
- monitor attaching to anchors or belay systems
- monitor belay rope(s) to keep them at the appropriate length
- monitor belay systems to remove unnecessary slack in belay ropes
- providing appropriate instruction to mitigate risks caused by the stretch in dynamic rope.

To reduce the potential for falls from height, procedures SHOULD include:

- designating what areas that are not to be entered
- designating waiting areas
- designating areas that can only be accessed when attached to the belay system
- checking participant’s equipment is correctly fitted before they need to rely on the belay system
- checking correct attachment to the belay system, safety or other systems
- anchoring the belayer where the belay system relies substantially on the belayers weight to arrest a fall and the weight of the abseiler or climber is greater than that of the

Consideration MUST be given to the need for separately spotting climbers when starting their ascent, until such time the climber reaches a fall height where the belay system will full operate to stop their fall before they touch the fall zone.

## 7.6.8 Fall safety systems

### 7.6.8.1 Belay and activity systems

Procedures to ensure that all “activity leader supervised” systems function as intended MUST include:

- anchor systems and equipment are suitable for the activity, site and participants
- appropriate knots and connections are used
- regular inspection of all anchors and connections where practicable
- operating procedures and checks used will prevent unplanned disconnection of any part of the system
- checking attachment and disconnection to the system during the activity.

Appropriate assessment SHOULD consider and address the possible differences between **participant** and **activity leader** usage of systems.

Where a **belay system** relies on a lanyard, throughout the climb the climbers harness attachment point SHOULD not be higher than the safety point that the lanyard is attached to. (This means the **fall factor** on a lanyard SHOULD not exceed 1.0 – refer [Appendix 4 - Fall factors](#).)

### 7.6.8.2 Assisted belay

Where **participants** are **belaying**, they MUST be instructed and appropriately supervised.

Where a belay system requires a belayer, either the **belayer** MUST be:

- verified as a **competent** belayer or
- under **Level 1 or 2** supervision of an **activity leader**.

### 7.6.8.3 Self belays

#### Two lanyard safety systems

Procedures MUST be in place to minimise the likelihood of placing a head/neck between the two lanyards when using a two-lanyard safety system. (*For example, informing of procedures to reduce risk, lanyards are kept in front while using, lanyards are held together while progressing.*)

#### Auto belays and continuous self-belays

Procedures to ensure that all **auto belay** and **interlocking continuous self-belay** systems function as intended MUST include:

- anchor systems and equipment are suitable for the activity, site and participants
- appropriate knots and connections are used
- operating procedures and checks used will prevent unplanned disconnection of any part of the system
- appropriate training of participants in use of the “automated systems”
- confirming **competence of participants** in using the “automated systems” prior to them undertaking the activity without **Level 1 or 2** supervision
- ongoing **level 3** supervision of the activity.

#### 7.6.8.4 Collective belays

##### Barriers

A risk assessment and supervision plan **MUST** consider if monitoring is required to ensure fixed barriers are not disregarded.

##### Soft-fall

A risk assessment and supervision plan **MUST** be used to determine the supervision required when falls from height are solely protected by **soft-fall**.

##### Deep water

Supervision of “pools” used to protect from falls of height **MUST** conform with any required ‘pool safety’ legislative or regulatory requirements of the relevant jurisdiction(s) the activity operates in.

Supervision arrangements **MUST** include:

- appropriate rescue requirements
- appropriate training of **activity leaders** responsible for water rescue
- **Level 1 or 2** supervision visual supervision at all times in the event a person becomes unconscious while in the water.

##### Netting

A risk assessment and supervision plan **MUST** be used to determine the supervision required when falls from height are protected by netting.

#### 7.6.8.5 Spotting belays – low elements and adventure games

Where **participants** are **spotting** they **MUST** be instructed and appropriately supervised.

Where a safety system requires a **spotter**, either the **spotter** **MUST** be:

- a **competent** spotter or
- under **Level 1 or 2** supervision of an activity leader.

The number of **spotters** required and their location in relation to the climber **MUST** be determined prior to the activity for each **element** or **adventure game**.

Considerations in determining the number of **spotters** and their location **SHOULD** include but are not limited to:

- the nature and design of the element or adventure game
- the likelihood of falling and possible directions of the fall
- whether the element has ‘holds’ on vertical, inclined and/or overhanging surfaces
- the body orientations that the element or ‘holds’ permit, or the adventure game requires
- obstacles in the fall zone
- the use of padding to protect from hazards in the fall zone and/or hard landings
- the number of active participants enables activity leaders to monitor, detect and correct improper procedures.

#### 7.6.8.6 Flying foxes

A full body harness or combination chest and sit harness **MUST** be considered when using a flying fox, to mitigate the risk of falling out of a sit harness when inverted.

#### 7.6.8.7 Giant swings

A full body harness or combination chest and sit harness **MUST** be considered when using a giant swing, to mitigate the risk of falling out of a sit harness when inverted.

### 7.6.8.8 Rescue systems

Rescue systems MUST allow for a timely and effective rescue.

Considerations for rescue systems SHOULD include but is not limited to:

- load direction including multi-direction loads
- load magnitude
- ability to raise the person
- ability to lower the person
- ability to enable an activity leader to complete contact rescues.

### 7.6.8.9 Harness hang syndrome

Harness hang syndrome is medical complications due to being “suspended within a body harness for a prolonged period of time (5 to 30 minutes)” (reference: Australian Resuscitation Council – Guideline 9.1.5 – July 2009). Harness hang syndrome can lead to blood pooling, “shock”, unconsciousness and/or death. It is also known as ‘suspension trauma’ or ‘suspension syndrome’.

Emergency management plans MUST include:

- rescue of unconscious persons suspended in a harness
- guidance on trigger points for considering the possibility of ‘harness hang syndrome’ occurring
- appropriate actions to follow where ‘harness hang syndrome’ is suspected, including but not limited to the relevant first aid treatment.

### 7.6.9 Falling objects

Procedures to minimise the possibility or impact of falling objects MUST include:

- checking the site prior to use
- ensuring helmets are worn where relevant as per the equipment section
- designating waiting areas that reduce the expose to falling objects
- briefing **participants** on potential hazards and how to avoid dislodging objects
- briefing **participants** on the appropriate action and warnings to give if an object does fall
- managing groups so that the groups and individual’s exposure within potential falling object areas is minimised
- minimising movement between areas that are located below others
- supervision of **participants** while they are located above others.

Procedures to minimise the possibility or impact of falling objects SHOULD include but are not limited to:

- placing belay areas where ever possible so that they are not directly under the climber
- managing spectators and/or other people moving through the area.

### 7.6.10 Entanglement and snags

To avoid entanglement in ropes and devices:

- long hair MUST be secured to stop it being able to be entangled
- loose jewellery (*e.g. bracelets and necklaces*) and watches SHOULD be removed or secured
- loose clothing SHOULD be secured
- clothing and hat drawstrings SHOULD be secured.

To avoid being caught or snagged, where there is such a risk:

- rings SHOULD be removed or taped over
- body piercings SHOULD be removed or taped over
- loose jewellery (*e.g. bracelets and necklaces*) and watches SHOULD be removed or secured.

The **activity leaders** SHOULD monitor belay rope(s) to keep them at the appropriate length and tension, to prevent the possibility of a slack rope becoming entangled or snagged.

### 7.6.11 Activity leader fatigue and repetition

Considerations for **activity leader** fatigue SHOULD include but is not limited to:

- time required to complete tasks
- task repetition
- weather (e.g. hot temperatures etc.).

Considerations in managing **activity leader** fatigue and task repetition risks SHOULD include but are not limited to:

- group sizes and the number of groups
- role rotation
- suitable breaks.

### 7.6.12 Spectators

Any spectators SHOULD be directed to an appropriate waiting area to view the activity.

# Glossary

## G1 - Glossary

Also refer terms and definitions from '[Core Good Practice Guide](#)'.

**Active Participant:** a participant who is either a **climber**, **abseiler**, **belayer** or **spotter**.

**Adventure Games:** an activity which is not identifiable as a **low element** or **high element** activity, but which require **spotting** to protect a participant if they fall. Activities that do not require **spotting** are 'games'.

**Artificial surface(s):** a man-made structure. Also called 'artificial structures' and [may] include but is not limited to portable climbing/abseiling walls, climbing gyms, challenge course elements, fixed climbing/abseiling or other towers, buildings and bridges.

**Assisted belay** (also known as 'dynamic belay' and 'team belay'): **belay system** operated by at least one person who is not the **climber**.

**Auto belay:** a specialized belay device that operates automatically and removes the need for a belayer.

**Belay System:** The means by which the **climber** or **abseiler** is protected from an uncontrolled fall or descent.

**Belayer:** A person that operates the **belay system**.

**Bouldering:** A form of climbing activity, limited in height and for which fall safety can be achieved by the provision of an impact absorbing system, by a **spotter** providing control of a fall or by a combination of these measures.

**Carabiner:** (refer **connector**).

**Climber:** the person who is protected by **spotting** or a **belay system**.

**Competence:** ability to apply knowledge and skills to achieve expected results.

**Competencies:** the plural of competence. Having competence in more than one ability.

**Competent leader/participant/person/assessor:** someone who has the **competence** to perform specific functions.

**Connector(s):** a metal device used to link components together. A connector may be:

- **Non-locking:** a connector that cannot be locked to prevent it opening.
- **Self closing:** a connector that automatically closes.
- **Locking:** a connector that can be manually locked and unlocked [without a tool] to reduce the possibility of it opening.
- **Tool locked:** a device that requires a tool to manually lock and unlock. A maillon is an example of a tool locked connector.
- **Auto-locking:** a connector that will automatically lock to prevent it from opening and requires two or more deliberate actions to unlock.

**Contact rescue:** a rescue requiring an activity leader to manoeuvre to the persons actual location to physically assist them.

**Collective belay:** a fall from height safety system that operates without a person intervening or operating. For example, **soft-fall** or a pool of water in a fall zone, guardrail, fence etc.

**Continuous belay: belay system** that enables climbers to progress from one activity system element to the next and that does not require climbers to undo or change the connection to the belay system.

**Dynamic belay:** refer **assisted belay**.

**Dynamic rope:** a specially constructed kernmantle rope that is somewhat elastic under load. The elastic 'stretch' under load is what makes the rope 'dynamic'. (Also see **static rope**.)

**Element:** a temporary, mobile or permanent physical structure where a person requires a system to them protected from an uncontrolled fall or descent.

**Fall height:** The vertical distance between the climber's or abseiler's lowest body element and the surface beneath.

**Fall factor:** is the ratio of the height of a fall (h) (measured before the rope or lanyard begins to stretch) and the rope or lanyard length available to absorb the energy of the fall (L). It is used as a representation of the severity of a fall when arrested by a belay system. It is calculated by (h) divided by (L).

**Fall zone:** The surface that can be hit by a climber or abseiler falling.

**Flash flooding:** is flooding in a localised area with a rapid onset, usually as the result of relatively short intense bursts of rainfall.

**Flying fox:** a means of travel along a sloping rope or cable by attaching to it using a free moving pulley and being propelled by gravity.

**Haul system:** [to be completed].

**High element:** (also known as high ropes) is any element or series of elements where the **fall height** means fall safety requires a **belay system** using harnesses and specialist safety equipment or other established methods or systems.

**Interlocking device:** a **belay system** using two lanyards that have interconnected carabiners, so that when one carabiner is locked it automatically leads to unlocking the other one and vice-versa.

**Level 1, 2 or 3:** describes the type of supervision provided to participants. The level meaning is:

- **Level 1** – where a nominated person responsible for supervising others during all or part of the activity is able to physically intervene immediately. (Aligns with level 1 in Australian Standard AS 2316.2.2:2016 and direct supervision in the Core GPG).
- **Level 2** – where a nominated person responsible for supervising others during all or part of the activity is able to visually see the participant(s) and verbally intervene immediately. (Aligns with level 2 in Australian Standard AS 2316.2.2:2016 and direct supervision in the Core GPG).
- **Level 3** – where a nominated person responsible for supervising others during all or part of the activity is in the vicinity and able to respond promptly to provide assistance when called upon. (Aligns with level 3 in Australian Standard AS 2316.2.2:2016 and indirect supervision in the Core GPG).

**Level of supervision:** a category system that indicates the type of supervision provided to participants. (Refer Level 1, 2 or 3 for the categories used in this GPG.)

**Low element** (also known as low ropes or obstacle courses): any element or series of elements where the **fall height** means fall safety can be achieved by **spotting**, using an impact absorbing system or by a combination of these measures.

**Low obstacle(s):** a temporary, mobile or permanent physical structure where a person does not require a system to them protected from an uncontrolled fall or descent. (Also refer **low element**.)

**Minimum Breaking Strength (MBS):** is the magnitude of a load that may permanently distort or damage equipment but not cause it to break. (Refer appendix 3 – equipment load ratings).

**Natural surface(s):** the geologic structure and flora that forms a cliff or steep face.

**Non-actively participating:** a **participant** that is waiting to but is not currently doing the activity.

**Responsible person:** a **competent** person who is able to complete delegated elements or tasks during an activity that does not require the activity-specific **competence** of a **activity leader**.

**Safety Factor:** the ratio between the **Minimum Breaking Strength (MBS)** and **Safe Working Load (SWL)** to provide a safety margin. It is expressed as a ratio, example 8:1. (Refer appendix 3 – equipment load ratings).

**Safe Working Load (SWL):** is the magnitude of load that does not permanently distort, weaken, damage or break equipment and includes a safety margin. (Refer appendix 3 – equipment load ratings).

**Self-belay** (also known as static belay): **belay system** that is operated by the climber.

**Self closing:** a connector that automatically closes.

**Self locking:** (see connectors – **auto-locking**).

**Slackline:** a type of **element** formed by a length of flat webbing that is tensioned between two anchors.

**Soft-fall:** an impact-absorbing surface.

**Spotter(s):** a person or persons who are **spotting**.

**Spotting:** a support process provided by a person, or persons, who offer physical protection of the head and upper body of a person should they fall.

**Stated Strength:** the magnitude of load that is either the **Minimum Breaking Strength (MBS)** or **Safe Working Load (SWL)** marked on equipment or listed in manufacturer's literature. (Refer [Appendix 3 – equipment load ratings](#)).

**Static belay:** see **self-belay**.

**Static rope:** a specially constructed low stretch kernmantle rope, that has low elongation under load. The low elongation or 'stretch' under load is what makes the rope 'static'. (Also see **dynamic rope**.)

**Team belay:** a type of assisted belay. Refer assisted belay.

**Temporary element:** an element that does not remain in place no longer than consecutive seven days.

**Tool locked:** a device that requires a tool to manually lock and unlock. A maillon is an example of a tool locked connector.

**Waiting areas:** a location in which to wait prior to undertaking the activity, where it is reasonable for a person to not be required to use equipment to protect them from a fall from height.

# Appendices

## A1 Appendix 1 – Challenge course equipment

The equipment required and the appropriate “type” of equipment used is dependent on the specific context of the activity.

Equipment used for challenge courses MAY include but is not limited to:

### A1.1 High elements specific equipment

- Accessory cord
- Artificial fixed anchors used in elements
- Ascending devices
- Belay devices
- Cables, wires and other fixed ropes
- Carabiners or other connectors
- Descending devices
- Dynamic rope
- Harnesses
- Helmets
- Lanyards
- Pulleys
- Shear reduction devices
- Slings
- Static rope
- Tethers.

Rescue equipment MAY include but is not limited to:

- Additional rope
- Pulleys
- Ascenders
- Prusik loops
- Slings
- Climbing cord
- Carabiners
- Cowstails or claws
- Belay device
- Knife suitable for cutting ropes (preferably on a lanyard)
- pliers or multi-grips

### A1.2 Low elements specific equipment

Specific equipment for climbing MAY include but is not limited to:

- Crash pads or padding

### A1.3 General equipment

General equipment used for challenge courses MAY include but is not limited to:

#### **Emergency/rescue**

- Documentation (see Core Good Practice Guide – activity leader required documentation)
- Emergency communication equipment (see Core Good Practice Guide – emergency communication)

- First aid kit in waterproof storage (see Core Good Practice Guide – first aid equipment and medication)
- A waterproof method of storing and carrying documentation and communications equipment
- Specific activity context equipment required (see list above)
- Emergency shelter where appropriate for the context
- Emergency equipment to keep a patient warm (e.g. mat, sleeping bag) where appropriate for the context

#### **Activity Leaders**

- communications equipment (standard communication rather than emergency communication where this differs) and spare batteries or backup “power banks”
- pen/pencil and blank writing paper
- watch or equipment suitable to tell and measure time for first aid purposes
- head torch and spare batteries
- gloves
- same as for participant

#### **Participant**

- personal medications (including for asthma and anaphylaxis)
- personal hygiene requirements
- clothing appropriate to the weather conditions
- sun hat
- sunglasses
- spare prescription glasses
- sunscreen
- gloves

#### **Group**

- backpack to carry equipment
- trowel for toileting
- toilet paper
- hand sanitiser
- water purification ‘system’
- repair kit
- food for duration plus spare
- rubbish bags
- multi-tool with knife
- sunscreen
- insect repellent
- Refer Core Good Practice Guide for first aid kit common content.

## A2 Appendix 2 – Equipment related standards

### Challenge courses:

- AS 2316.2.1:2016 Artificial climbing structures and challenge courses Part 2.1: Flying foxes and challenge ropes courses—Construction and safety requirements (EN 15567-1:2007, MOD)
- AS 2316.2.2:2016 Artificial climbing structures and challenge courses Flying foxes and challenge ropes courses – Operation requirements (EN 15567-2:2007, MOD)

### Fixed and mobile artificial climbing and abseiling walls:

- AS2316.1—2009 – Part 1—2009 Artificial climbing structures and challenge courses Part 1: Fixed and mobile artificial climbing and abseiling walls.

### Equipment and the relevant standards:

- Accessory cord (EN 564)
- Braking devices (EN 15151-1, EN 15151-2)
- Carabiners or other connectors (EN 362, EN 12275, AS/NZS 1891.4 or ISO 10333-5)
- Chocks (EN 12270)
- Crash pads/padding (AS2316.1—2009 – Part 1, UIAA 161-3)
- Descending devices (EN 341)
- Energy absorbing systems EN 958
- Frictional anchors EN 12276
- Helmets (EN 12492)
- Harnesses (EN 358, EN 361, EN 813, EN 12277, AS/NZS 1891.4 or equivalent)
- Lanyards (EN 354)
- Rock anchors (EN 959)
- Rope clamps EN 567
- Rope – dynamic (EN 892)
- Rope – static (EN 1891, AS 4142.3, CI 1801)
- Personal fall protection equipment – anchor devices (EN 795)
- Pitons (EN 569)
- Pulleys (EN 12278)
- Slings (EN 566, AS 1353 (series) or AS/NZS 1891.4)

### List of relevant standards

#### AS/NZS

- 1353 Flat synthetic-webbing slings Product specification
- 1891 Industrial fall-arrest systems and devices
- 4 Part 4: Selection, use and maintenance
- AS2316.1—2009 – Part 1—2009 Artificial climbing structures and challenge courses Part 1: Fixed and mobile artificial climbing and abseiling walls.
- AS 2316.2.1:2016 Artificial climbing structures and challenge courses Part 2.1: Flying foxes and challenge ropes courses—Construction and safety requirements (EN 15567-1:2007, MOD)
- 2512 Methods of testing protective helmets 1 Part 1: Definitions and headforms

#### CI

- 1801 Low Stretch And Static Kernmantle Life Safety Rope

#### EN

- 341 Personal protective equipment against falls from a height—Descender devices
- 354 Personal protective equipment against falls from a height—Lanyards

- 358 Personal protective equipment for work positioning and prevention of falls from a height—Belts for work positioning and restraint and work positioning lanyards
- 361 Personal protective equipment against falls from a height—Full body harnesses
- 362 Personal protective equipment against falls from a height—Connectors
- 564 Mountaineering equipment—Accessory cord—Safety requirements and test methods
- 566 Mountaineering equipment—Slings—Safety requirements and test methods
- 567 Mountaineering equipment—Rope clamps—Safety requirements and test methods
- 569 Mountaineering equipment. Pitons. Safety requirements and test methods
- 795 Personal fall protection equipment. Anchor devices
- 813 Personal fall protection equipment—Sit harnesses
- 892 Mountaineering equipment—Dynamic mountaineering ropes—Safety requirements and test methods
- 958 Mountaineering equipment. Energy absorbing systems for use in klettersteig (via ferrata) climbing. Safety requirements and test methods
- 959 Mountaineering equipment. Rock anchors. Safety requirements and test methods
- 12270 Mountaineering equipment. Chocks. Safety requirements and test methods
- 12275 Mountaineering equipment—Connectors—Safety requirements and test methods
- 12276 Mountaineering equipment. Frictional anchors. Safety requirements and test methods
- 12277 Mountaineering equipment—Harnesses—Safety requirements and test methods
- 12278 Mountaineering equipment—Pulleys—Safety requirements and test methods
- 12492 Mountaineering Equipment – Helmets For Mountaineers – Safety Requirements And Test Methods
- 15151-1 Mountaineering equipment. Braking devices. Braking devices with manually assisted locking, safety requirements and test methods
- 15151-2 Mountaineering equipment. Braking devices. Manual braking devices, safety requirements and test methods
- 1891 Personal protective equipment for the prevention of falls from a height—Low stretch kernmantel ropes

#### ISO

- 10333 Personal fall-arrest systems
- 10333-5 Part 5: Connectors with self-closing and self-locking gates

#### UIAA

- 161-3 Crash Pads

## A3 Appendix 3 – Equipment load ratings

Proper understanding and use of equipment load ratings (**stated strength**) is needed to allow for an appropriate safety margins (**safety factors**) to be used. This ensures that equipment is never loaded to a point it is in danger of breaking or being damaged.

Manufacturers provide details of the load ratings for equipment either stamped on the equipment or in available documentation. This is called the **Stated Strength**. **Stated Strength** is the magnitude of load that is either the **Safe Working Load (SWL)** or **Minimum Breaking Strength (MBS)**.

It is critical to understand the difference between **Safe Working Load (SWL)** and **Minimum Breaking Strength (MBS)** because SWL has a safety factor already applied to it, while MBS does not.

**Safe Working Load (SWL)**: is the magnitude of load that does not permanently distort, weaken, damaged or break equipment. It is safe to load equipment to 100% of the SWL.

**Minimum Breaking Strength (MBS):** is the magnitude of a load that may permanently distort or damage a piece of equipment but not cause it to break. An appropriate **safety factor** needs to be applied to the MBS. The MBS is a load, determined by the manufacture, that might not break a piece of equipment but may make it unusable or unsafe to use. Equipment should never be loaded to the MBS, even for testing purposes when testing a system before being use, the test should not exceed the SWL. Some equipment may be in danger of being overloaded even at less than half the MBS. It should be noted that the stated MBS value is calculated from tests on a selection of items, not on each individual item. It is therefore likely that a small percentage of similar items, (usually less than 1%) will break slightly below their stated MBS value.

**Safety Factor:** The ratio between the **Minimum Breaking Strength (MBS)** and **Safe Working Load (SWL)** which is used to provide a safety margin. It is expressed as a ratio for example 8:1. An appropriate **Safety Factor** is chosen based on the type of equipment and intended use. The **safety factor** applicable may be specified in relevant standards or manufactures instructions. It is recommended to follow known safe practices, manufacturers recommendations, relevant standards or calculated assessments when determining safety factors.

### A3.1 Examples

#### A3.1.1 Rope

Recreational 'climbing/abseiling' rope may have the **Stated Strength** provided as a **Minimum Breaking Strength (MBS)**. In use, it requires a suitable **Safety Factor** to be selected and applied to the MBS to calculate appropriate SWL.

##### **Static rope:**

- Stated strength: 30kN MBS
- Safety Factor: say 8:1
- Safe Working Load (SWL): 3.75kN (30 divided by 8 = 3.75)

##### **Flat lifting sling:**

A flat lifting sling may have the **Stated Strength** provided as a **Safe Working Load (SWL)**. In use, it can be loaded to 100% of the SWL.

- Stated strength: 2,000 kg SWL
- Safety Factor: may or may not be provided by manufacturer
- Safe Working Load (SWL): 2,000 kg (No calculation required as Stated Strength given as SWL)

The Australian Standard AS1353 states that a 2,000 kg SWL flat lifting sling should have a 8:1 safety factor. If this is the case, then the MBS is 16,000 kg (2,000 times 8 = 16,000).

#### A3.1.2 Connectors

Recreational 'climbing/abseiling' connectors may have the **Stated Strength** provided as a **Minimum Breaking Strength (MBS)**. In use, it requires a suitable **Safety Factor** to be selected and applied to the MBS to calculate appropriate SWL.

##### **In-line loaded carabiner:**

- Stated strength: 24kN MBS
- Safety Factor: say 4:1
- Safe Working Load (SWL): 6kN (24 divided by 4 = 6)

All equipment needs to have its **Safe Working Load (SWL)** estimated using an appropriate **safety factor** for the context it is being used. They are not to be loaded above their SWL.

**Case example**

On the 4th of May 2014, in Rhode Island USA, a 45kN carabiner was overloaded and failed with a 6.8kN three-way load, causing 8 circus performers to fall 10m. The subsequent investigation showed that similar carabiners, in new condition, also failed when similarly loaded but easily held 50kN when in-line loaded.

**A3.2 Kilonewtons (kN) of force vs kilograms (kg) of load (mass)**

Newtons, (abbreviated to N) are the metric units of force. A 102kg object applies, approximately, 1,000 N, (1kN) downward force at the surface of the earth, (due to its mass and gravity). One Kilonewton (1 kN) is 1,000 N.

In a simple vertical loading situation, it is generally accurate enough to convert a load mass of 100 kg to a force of 1kN. Forces can exist in any direction, not just up and down. Force is calculated by multiplying mass by acceleration. Gravity at earth's surface produces approximately 10m/s<sup>2</sup> of acceleration, (the exact value varies and is slightly less).

Therefore, equipment rated 1 kN of force equals equipment rated approximately 100kg of load (1,000N divided by 10 = 100kg of load). So 1kN of force = approximately 100kg of load. Note that peak loads can vary and allowance for these should be made.

**A3.2.1 Examples:**

SWL 3.75kN force equals approximately 375kg static load

- o Calculation: 3.75 times 1,000 = 3,750N with 3,750N divided by 10 = 375 or
- o Calculation: 3.75 times 100 = 375

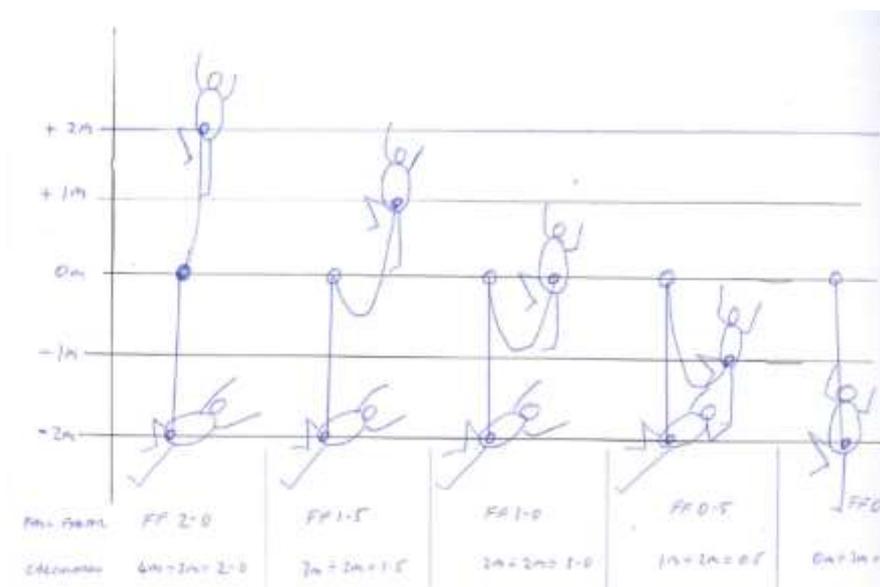
SWL 2,000kg static load equals approximately 20kN force

- o Calculation: 2,000kg times 10 = 20,000N with 20,000N divided by 1,000 = 20 or
- o Calculation: 2,000kg divided by 100 = 20

**A4 Appendix 4 – Fall factor**

**Fall factor:** is the ratio of the height of a fall (h) (measured before the rope or lanyard begins to stretch) and the rope or lanyard length available to absorb the energy of the fall (L). It is used as a representation of the severity of a fall when arrested by a belay system. It is calculated by (h) divided by (L).

**DRAFT** Fall factor diagram



## A5 Appendix 5 – Inspections and maintenance

Also refer section 6.6 Equipment – Inspections & maintenance.

An ongoing inspection and maintenance procedure is essential for ensuring the integrity of the ropes course structure and associated equipment.

There are various types of inspections:

- Inaugural
- Ongoing:
  - Routine visual
  - Operational
  - Periodical
- Tree.

### A5.1 Inaugural inspection

An inaugural inspection **MUST** be completed before a newly built course is put into service. It only needs to be completed once.

The inaugural inspection **MUST** be conducted by a suitably competent ropes course inspector. A thorough understanding of how the equipment will be used is required. It is very important that the inspector be independent from the manufacturer and owner of the new course.

The purpose of the inaugural inspection is to check that the:

- design is functional
- design calculations, tree reports and weld inspections exist
- course has been constructed as per the design
- manufactures instructions exist for usage, inspections and maintenance requirements.

Manufacturers of ropes courses need to specify the frequency of ongoing inspections, and any special inspection or maintenance requirements.

### A5.2 Ongoing inspections

There are four layers of ongoing inspections. The purpose of each is to ensure that the structure is safe, and that damage to and degradation of materials is detected before failure.

#### **1 – Routine visual check**

The routine visual check **MUST** be completed by a competent person before each use of the course.

Daily inspection is usually done by a well trained instructor.

The inspection looks to confirm:

- there is no obvious damage
- site is safe
- the integrity of the safety systems.

#### **2 – Operational inspection**

The operational inspection **SHOULD** be completed by a competent person at least quarterly, or as per the manufacturers advised requirements.

It **SHOULD** include:

- all of the routine visual checks

- a more detailed closer inspection to confirm no] damage or degradation. (Examples MAY include but is not limited to loose bolts, damaged or rotten timber, tightness of ropes/elements, damaged/worn wire rope etc.).

### 3 – Periodical inspection

The periodical inspection SHOULD be completed by an independent competent person annually or as per the manufacturers advised requirements. The time between periodical inspection SHOULD be no more than 15 month between inspections.

It SHOULD include:

- Routine visual check
- Operational inspection
- Assessment of worn components
- And where the inspector deems necessary:
  - dismantling of parts,
  - excavation to reveal condition of items underground and/or
  - routine proof testing.

### 4 – Tree inspections

If the ropes course is built in trees, the trees SHOULD be inspected, by a competent person annually or as per the manufacturers advised requirements.

Inspection of trees SHOULD also be considered if the course is built among or beneath trees.

The time between periodical inspection SHOULD be no more than 15 month between inspections.

Expert arboriculturists SHOULD be used to verify that the trees are in good health and fit for purpose. Arboriculturists are usually not required to be experts in the forces imposed on the trees by the ropes course.

#### Inspection reports

All reports SHOULD be retained.

### A5.3 Maintenance

Maintenance is typically defined as “like for like replacement of worn out parts”.

Maintenance is usually performed by a suitably competent person specialised in building ropes courses.

#### Modifications

A modification occurs if maintenance changes the functional operation of the ropes course, or the loads imposed on the course. A modification usually requires a new inaugural inspection.

Examples of modification MAY include but is not limited to:

- adjusting the sag in a zip line so that it runs faster or slower
- re-locating an element to make its span longer.

## A6 Appendix 6 – Safety diagrams for two lanyard self-belay systems

Also refer [Equipment - Self-belay systems with two safety lanyards](#)

Also refer [Equipment Section](#) for detail of other requirements relating to lanyards.

### A6.1 Diagram – Unequal lengths or gap between lanyards

**Self-belay** systems with two safety lanyards **MUST** be designed to minimise possible user entrapment pressure on the neck and/or head and eliminate possible strangulation by:

- either having unequal lanyard lengths so in the event of a fall, one lanyard is loaded and the second lanyard remains loose even if both are attached to the belay anchoring system OR having sufficient gap between the two lanyards (*examples a) both lanyards are held apart by a 'rigid spreader' or b) the lanyards are attached to separate attachment points on the harness*) so even if both are loaded, entrapment between the lanyards does not occur
- each separate lanyard is constructed so it forms a 'single piece' of material that does not form a loop that creates an entrapment hazard. (*Examples a) interlocking device lanyards are appropriately sheathed to prevent individual components creating a 'loop entrapment hazard', while b) a lanyard created from material (e.g. webbing) tied into a loop would create a 'loop entrapment hazard' must not be used*).

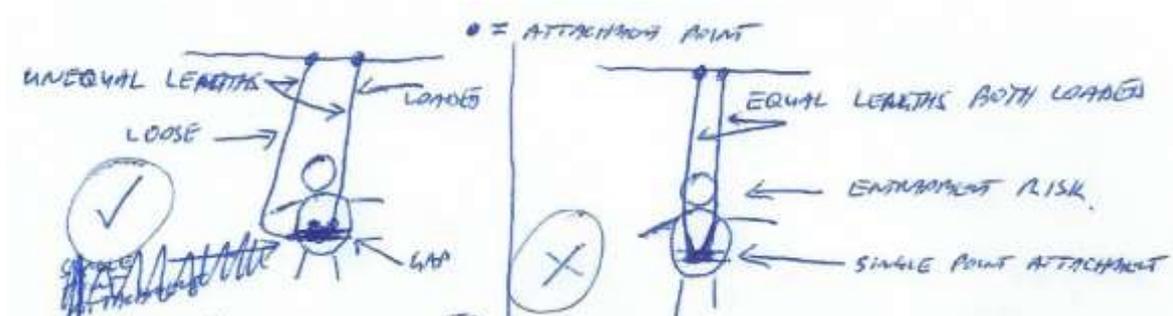
While progressing across an element while using a two lanyard self-belay system, both lanyards of the self-belay system **SHOULD** be attached to the belay anchoring system.

#### A6.1.1 Unequal length lanyards

Common practice is to leave both lanyards attached to critical line (i.e. anchor point) during progress across an element

Where unequal length lanyards are used in the event of a fall, only one lanyard is loaded with the second lanyard **MUST** remaining loose

#### **DRAFT diagram 1**



**Diagram 1** – Lanyards to be of unequal length (as shown in diagram 1-A).

The effective minimum difference in length between the two unequal lanyards, taking into account the connectors being used **MUST** be sufficient to alleviate the risk of entrapment.

#### A6.1.2 Sufficient gap between lanyards

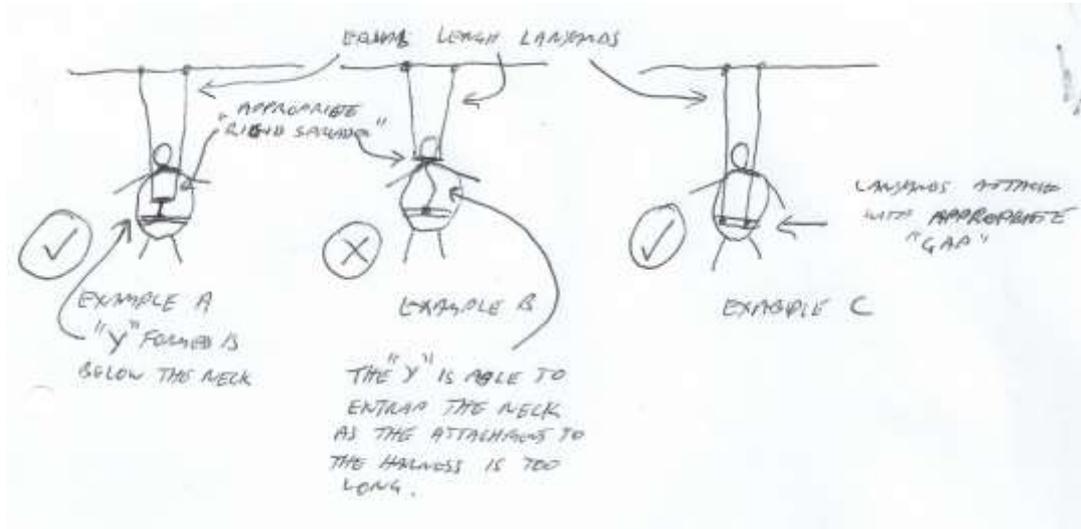
Where two unequal length lanyards are not used, the minimum 'rigid spreader' or gap distance between the lanyards harness attachment points **MUST** be sufficient to alleviate the risk of entrapment.

- There **MUST** be sufficient gap between the two lanyards when loaded to avoid possible entrapment

**Self-belay** systems with two safety lanyards **SHOULD** be designed to minimise possible user entrapment pressure on the neck and/or head and eliminate possible strangulation by:

- having the point at which both lanyards join together or are separated by a 'rigid spreader', located at a distance when under load, it sits below the height of the climbers neck, so in the event of a fall, the weight of the climber is supported by their harness and the climber cannot be trapped by the neck in the join or by the 'rigid spreader'. (Examples a) the join or spreader forms a "Y" at the climbers belly/chest level due to the short length between harness attachment and where the "Y" occurs, b) the join or spreader forms a "Y" located at the climber's face level or higher, so in a fall the Y could trap the climbers neck and the climbers weight take by the neck rather than the harness and should be avoided.)

**DRAFT diagram 2**



**Diagram 2** – The minimum 'spreader' or gap distance between the lanyards MUST be sufficient to alleviate the risk of entrapment. Where lanyards join and form a "Y", when under load this SHOULD be at a point lower than the climber's neck (as in diagram 2 example A).

Any 'rigid spreader' used for alleviating the risk of entrapment MUST be:

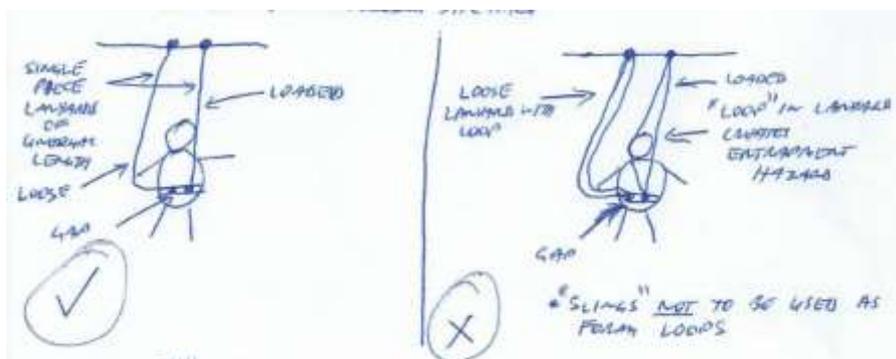
- of an appropriate design and material to operate as intended AND
- have a safe working load suitable for the task.

**A6.2 Diagram – Single piece or sheathed lanyards**

Self-belay systems with two safety lanyards MUST be designed to avoid user entrapment pressure on the neck and/or head by each separate lanyard is constructed so it forms a 'single piece' of material that does not form a loop that creates an entrapment hazard.

Each lanyard MUST be a 'single piece' OR appropriately sheathed:

**DRAFT diagram 3**



**Diagram 3** – Each lanyard to be made so are a "single piece" of material (shown in diagram 3-A) that do not form "loops" that can entrap (shown in diagram 3-B).

Example shown in diagram 3-A:

- a lanyard CAN be created from a single length of material (e.g. webbing), where:
  - A) each end of the material is appropriately knotted to attach the connectors which then allows each lanyard to be attach to the safety systems and the harness independently. (Note that the unequal length or sufficient gap requirements above MUST be meet.)
  - B) each end of the material is appropriately knotted to attach the connectors that allow each lanyard to attach to the safety systems, while the middle of the material is appropriately knotted to enable connection to the harness. (Note that the unequal length or sufficient gap requirements above MUST be meet.)

Example shown in diagram 3-B:

- a lanyard created from material (e.g. webbing) tied into a loop MUST NOT be used as it would create a 'loop entrapment hazard'

Multiple "strands" need to be appropriately sheathed (e.g. **interlocking device** lanyards appropriately sheathed to prevent individual components creating a 'loop entrapment hazard').

## A7 Appendix 7 – Challenge course supervision plans

Also refer to the Leadership – Supervision plans section 7.4.1

The following information provides an indication as what MAY be included in a challenge course supervision plan.

### A7.1 – Course diagram for visual reference

A course diagram or map provides a visual reference aid.

The diagram SHOULD include:

- a map – a visual representation that maps the site, course elements and other important locations. (While not necessarily drawn to an exact scale, it should appropriately reflect the relative proportions & distances, so it is not misleading regarding scale or location)
- element identification – an individual identification for each separate element and if needed a key matching the element type/name to the element identification on the diagram
- designated area(s) – location of any designated area(s) (e.g. activity leader supervision locations, restricted areas, helmet use areas)
- emergency plan locations – areas related to emergency plan (e.g. rescue equipment locations, first aid kit locations, emergency communication locations, evacuation routes & exits, emergency mustering points).

### A7.2 – Supervision and use

Information recorded in the plan for each individual element SHOULD include:

- A summary of the risks identified in the risk assessment
- Supervision requirements for the element(s) including:
  - the level of supervision needed (e.g. **level 1, 2 or 3**)
  - the number of active participants an activity leader can supervise at one time (e.g. supervision ratio, maximum number of active participants)
- Obstructions and/or conditions that may impact line of sight supervision and procedures to address them
- Any variation in supervision required depending on participant considerations

- Any variation in supervision required depending on equipment considerations (e.g. if different connector types are use like individual screw gate carabiners vs an interlocking device)
- Relevant manufactures specifications or requirements including but not limited to:
  - maximum number of climbers on the element at one time
  - recommended supervision
  - reference to any provided standard operating procedure(s)
- Any standard operating procedure(s) (SOP) required to use the element – either by including the SOP as an appendix or referencing to where the SOP can be found
- Any special competencies required by an activity leader to supervise the element
- Any training, induction or confirmation of competence required before activity leaders supervise the element
- Activity leader roles and/or specific individuals authorised to:
  - conduct training, induction in use of an element
  - supervise the element.

Information recorded in the plan for when multiple elements are in use at the same time SHOULD include:

- Supervision requirements for the various elements when used at the same time
- Where necessary specific location(s) to operate supervision from
- Any standard operating procedures:
  - For example, any limitations as to the use of various elements (e.g. due to lack of line of sight some elements cannot be used in certain situations)
  - Sequencing and progression through the elements
- Any relevant manufacture specifications or requirements (see above)
- Any activity leader requirements (see above)

Obstructions and/or conditions that may impact supervision visibility MAY include but is not limited to:

- Trees and branches
- Structures and equipment
- Sun locations at certain times
- Low light levels
- Weather events (e.g. rain, fog, overcast etc.)

### A7.3 – Activity leader roles and competencies

The activity leader roles and competencies section in the plan SHOULD include:

- What the competencies required are for each role
- The responsibilities of each role
- Any limitations place on a role (e.g. if able to operate/supervise an element or if they require any supervision while undertaking the role)
- Requirements for confirm someone is competent to undertake a role.

### A7.4 – Communications plan

Information in the communications plan SHOULD include:

- Any pre-activity information that needs to be supplied
- Any information that is required during the activity
- Communication standard operating procedures between activity leaders to maintain the required level of supervision.

### A7.5 – Emergency response plan

The emergency response plan SHOULD be included or if separate, referencing to where it can be found.

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