ASG

Activity Safety Guideline

Indoor Climbing

and climbing on other artificial structures

March 2016 Version 2

SupportAdventure.co.nz
SAFETY SYSTEMS DRIVEN BY SAFETY CULTURE

Preface

This Activity Safety Guideline for Indoor Climbing and Climbing on Other on Artificial Structures is published by the Tourism Industry Association of New Zealand (TIA) with support from WorkSafe New Zealand. The guideline was developed in association with experts from the climbing on artificial structures sector, and other relevant technical experts. More information about the guideline development process can be found at www.supportadventure.co.nz/activity-specific-good-practice-information/activity-safety-guidelines

The guideline is a web-based document and will be reviewed and updated as required. The current version is available at www.supportadventure.co.nz/activity-specific-good-practice-information/activity-safety-guidelines Users should periodically check the date and version number of the current online document to ensure that their printed copies are up-to-date.

Activity Safety Guidelines are the result of a recommendation from the final report of the 2009/10 government review of risk management and safety in the adventure and outdoor commercial sector in New Zealand. The variety of activities provided by these sectors is referred to broadly as adventure activities, and include activities provided by adventure tourism operators and outdoor education centres. More information about the government review can be found at www.supportadventure.co.nz/about-site-and-government-safety-review

TIA, WorkSafe New Zealand, and the climbing on artificial structures community have made every effort to ensure that the information contained in this guideline is reliable. We make no guarantee of its accuracy or completeness and do not accept any liability for any errors. We may change, add to, delete from, or otherwise amend the contents of this publication at any time without notice.

Development was managed by the Tourism Industry Association New Zealand: www.tianz.org.nz with the support of WorkSafe New Zealand: www.business.govt.nz/worksafe

Document control

Version 2

Change from Versions 1.3 and 1.2	Where
Amended the title to reflect common use	Title page and footer
Updated the regulator's name	Throughout document
Changed the technical expert definition	Definitions
Changed the wording regarding NZ standards	Section 3.1
Added a note on autobelay devices	Section 5.1
Updated qualifications	Section 6.3
Changed *daisy chain* to *anchor chain*	Section 9.1
Added route setting equipment guidelines	Section 9.1
Added a note on rescue equipment	Section 9.2

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Other publications

This guideline contains adventure tourism and outdoor commercial sector information published on the SupportAdventure website.

This guideline contains public sector information published by WorkSafe New Zealand.

This guideline refers to Australian Standard 2316.1:2009 Artificial climbing structures and challenge courses – Fixed and mobile artificial climbing and abseiling walls.

Consultation

The guideline was developed in consultation with the climbing on artificial structures sector and other relevant experts. The following experts comprised the climbing on artificial structures activity safety guideline working group and are acknowledged for their advice and support:

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The following groups are also acknowledged for their input and support:

Climbing on Artificial Structures ASG support group; Maritime New Zealand; Mountain Safety Council; New Zealand Outdoor Instructors Association; Outdoors New Zealand; Outdoor Safety Auditors; Qualmark; ServiceIQ Industry Training Association; the Tourism Industry Association New Zealand; Water Safety New Zealand.

Contents

Definitions

This guideline assumes the reader has technical knowledge of the activity, and defines only those terms that may be unique to this guideline, are used in a specific way, or that would otherwise be open to interpretation.

For the purposes of this document the following definitions apply.

Assisted braking device
A belay device that involves moving parts or the geometry of the device to apply a braking force to a rope and actually assist a belayer catch a fall or hold a hanging climber, over and above that provided by a conventional belay device, eg Petzl Grigri and Wild Country SRC.

Autobelayed climbing
Climbing using an automatic belay device (no human belayer is required, eg the TRUEBLUE Auto Belay.

Belayer
Belayer refers to the primary person in the belay system; it does not include any back-up belayers.

Belay system
The means by which a climber or abseiler is protected from an uncontrolled fall or descent.

Competent person (at a specific task)
A person who can correctly perform the task. They have usually acquired the knowledge and skills to do this through a combination of training, qualification, and experience.

Client
A person (participant) who takes an active role in an adventure activity but is not in a leadership or supervisory role.

Climbing activities
All activities involving climbing or abseiling.

Climbing session
A block of time during which the artificial climbing structure is open to clients for climbing activities – a facility may run several climbing sessions in one day.

Direct supervision
When the person supervising is in a position to be able to physically intervene and manage anticipated hazards.

Edge
The place over which a person could fall if they are not attached to a safety system.

Fall zone
The surfaces that could be hit by a falling climber.

Ground anchor
Anchor at the base of the artificial climbing structure.

Good practice
The range of actions currently accepted within the adventure and outdoor sector to manage the risk of harm to staff, participants, and visitors.

Health and safety terms

See Appendix 1 for an explanation of the terms *all practicable steps, hazards* and *significant hazards,* and *serious harm.*

Incident

An event that caused or could have caused harm to any person.

Indirect supervision

Is when the person supervising is able to communicate with the person being supervised, but may not be able to physically intervene to manage hazards should they develop. There are two types of indirect supervision – proactive and reactive:

- Proactive indirect supervision is where the supervising staff member is actively monitoring the client and is in a position to provide verbal assistance to intervene and manage hazards.

- Reactive indirect supervision is where the supervising staff member is in a position to communicate verbally and provide assistance to a participant when sought, but may not be actively monitoring the client or providing pre-emptive assistance.

Operator

Person or other legal entity (whether an employer, principal, or self-employed person) that provides an adventure activity to a participant.

Qualified

A person who holds a current, nationally recognised qualification.

Risk

Effect of uncertainty on objectives.

Risk assessment

A process undertaken by a competent person to identify risks and assess the risks according to their significance – potential severity of impact and probability of occurrence.

Safety management plan (SMP)

The written plan outlining the systems an operator will use to manage safety.

Safety management system (SMS)

The overarching management system for directing and controlling an operation in regard to safety.

Sector

New Zealand adventure tourism and outdoor education providers, support organisations, and associations. A specific part of the sector may be referenced, eg the climbing on artificial structures sector.

Staff

Employees, contractors or volunteers who work for an operator and are responsible for the safety of clients undertaking climbing activities, eg client screening, instructing, and supervising clients.

Standard operating procedures (SOPs)

Written information outlining how an operator plans to conduct a particular activity or task.

Technical expert

A person who has professional credentials such as a high level, nationally recognised qualification, or extensive knowledge, skills, and experience. They advise auditors and operators with technical tasks, including reviewing activity practices.

Section 1: Introduction

This is an Activity Safety Guideline for climbing on artificial structures. It is split into 10 sections.

In Section 1 you will find:

- a description of the New Zealand climbing on artificial structures' sector
- an introduction to the legislative context for climbing on artificial structures in New Zealand
- an explanation of the purpose of this guideline and how it relates to the laws around health and safety
- an explanation of the scope and application of this guideline: what it covers, and how to use it to build your standard operational procedures and pass safety audits.

Section 2 is about the hazard management process. Sections 3 through 10 provide specific safety recommendations for climbing on artificial structures, and Section 11 gives information about reviewing your safety systems.

1.1   The artificial structures climbing sector

Commercial climbing on artificial structures in New Zealand is very popular and occurs in a range of environments from schools and outdoor education centres to YMCAs and climbing gyms. Autobelayed climbing is less widespread but is becoming more common in climbing gyms where it is usually sold as a 'climbing-as-entertainment' product aimed at families.

Operators often operate in isolation from their peers. There is no national association or similar group and it is unclear how many operators exist. Sector connections have begun to form over the last few years as some operators worked together towards developing guidelines for operating artificial climbing structures (ACSs) and qualifications specifically for use within ACS environments. The resulting draft guideline helped to inform this ASG. New qualifications covering sport climbing were developed in January 2013 by the New Zealand Outdoor Instructors Association (NZOIA).

Photo: Extreme Edge, Jason Corban
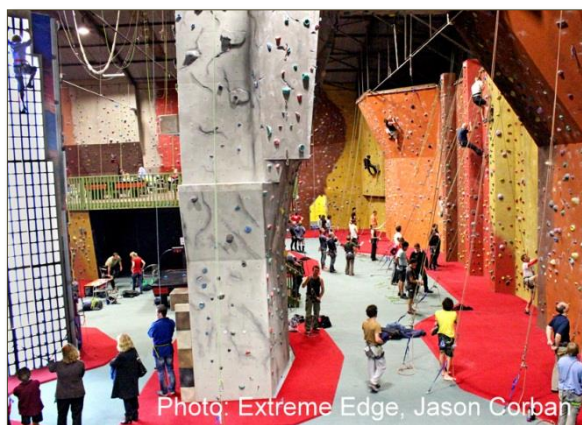
The development of this guideline has provided another opportunity for operators to work together and proved to be a moderating process for establishing industry safety recommendations. A crucial step in safety for the sector will be embedding the information in this guideline and moderating its implementation.

New Zealand's two largest specialist climbing gyms have been well connected with the international ACS community. Both providers have been pioneers of 'climbing as entertainment' and now sell their respective systems internationally.

There is also a competition aspect to climbing on artificial structures in New Zealand. This is managed by Climbing New Zealand and is strongly connected to the international competitive climbing community.

1.2   The legislation

Operations providing commercial climbing on artificial structures are subject to the Health and Safety in Employment Act 1992 (the Act).

The Health and Safety in Employment (Adventure Activities) Regulations 2011 (the Adventure Activities Regulations) apply to climbing on artificial structures only when those structures are outside, either fixed or mobile structures.

The health and safety legislation uses both *operators* and *providers* to refer to people or organisations who provide activities such as climbing on artificial structures. This guideline uses *operators* throughout.

1.3 Purpose of this ASG & the SupportAdventure website

This Indoor Climbing and climbing on other artificial structures ASG (the guideline) aims to provide practical safety guidance for operators of commercial climbing on artificial structures.

The SupportAdventure website provides practical guidance for adventure activity operators on developing good practice safety management systems. It includes information and examples for developing a safety management plan.

This guideline and the SupportAdventure website act as companions to the health and safety legislation. They are not part of the health and safety legislation, but following their recommendations will help operators meet legal requirements to take all practicable steps to identify and manage hazards.

Any investigation into an accident may look at how well an operator followed this guideline. Hazards can be identified and managed by following this guideline directly, or in other ways that achieve the same level of safety (or better). Before departing from the guidance given here, seek advice from a technical expert on climbing on artificial structures, or other competent person. An operator will need to be able to justify why they use a different method from the guideline.

The responsibility for making safe decisions remains with the operator.

1.4   What this guideline covers and how to use it

This guideline defines climbing on artificial structures as:

> Supervised recreational or competition climbing on an artificial structure. The structure may be inside or outside, fixed, or mobile.

It covers activities that meet this definition, whether or not they are advertised specifically as a climbing activity on an artificial structure.

Note: All parts of this guideline will not apply to all operators, eg monitoring lead climbing will not apply to some climbing structure activities.

This guideline describes what artificial climbing structure operators and technical experts consider good practice for actively managing safety when providing commercial climbing on artificial structures. It is written for operators of commercial climbing on artificial structures, and also for safety auditors as a benchmark for current good practice.

It will also be useful for:

- other people involved in climbing on artificial structures, such as people who rent out climbing facilities, trainers, and people involved with providing non-commercial climbing on artificial structures
- activities other than climbing on artificial structures that involve similar hazards, risks, and techniques.

This guideline focuses on preventing death or other serious harm. It identifies common significant hazards that clients, supervisors, and instructors may be exposed to. It describes steps for managing these hazards.

Activities associated with taking clients to and from climbing on artificial structures sites are outside the scope of this guideline.

'Safety Management Systems are made of a safety management plan underpinned and driven by a positive safety culture.' www.SupportAdventure.co.nz

For information on building a safety management system, go to www.SupportAdventure.co.nz

1.5   Use this guideline to build safety

As an operator, you must have an overall safety management system (SMS) to manage health and safety in everything you do. Your SMS must contain standard operating procedures (SOPs) for each activity you provide. These procedures are also called activity plans or activity management plans.

This guideline outlines good practice safety recommendations that are specific to climbing on artificial structures. Conduct a site specific hazard management process, consider the recommendations in this guideline, and add the relevant procedures to your SMS.

This guideline gives examples to explain hazards and other concepts. The examples are not exhaustive – think of other examples that could apply to your specific activity.

It is essential that, alongside activity specific assessments and the use of this guideline, staff identify and manage hazards dynamically.

1.6   Use this guideline to help you pass safety audits

Operators providing climbing on artificial structures are only legally required to undergo an external safety audit when the activity is outside, but all operators are encouraged to do so.

This guideline sets out relevant technical standards and recommendations for commercial climbing on artificial structures. The guideline will help safety auditors assess whether an operator is complying with good practice.

Safety audit standards specify the compliance requirements for adventure activity operators to reduce risks when providing adventure activities. View the Adventure Activities Regulations safety audit standard at: www.business.govt.nz/healthandsafetygroup/information-guidance/all-guidance-items/safety-audit-standard-for-adventure-activities-2013-requirements-for-a-safety-audit-of-operators-march-2013

Section 2: Hazard Management Process

This section looks at the following steps in the hazard management process:

- identifying and assessing hazards
- managing hazards
- managing the drugs and alcohol hazard
- using competent persons
- incident reporting and learning.

The hazard management process is a key part of an overall safety management plan. The steps involved enable hazard management to be built into SOPs.

Hazard management processes need to be driven by a positive safety culture. Apply hazard management processes to all operational situations including new activities, standard activities, and when there are changes to equipment or hazards.

Hazard management involves both a scheduled and dynamic approach to identify, assess, manage, communicate, and record hazards in every part of an operation.

2.1   Identifying and assessing hazards

Identify significant hazards both systematically and dynamically. Use a variety of methods to systematically identify hazards, such as:

- inspection schedules and protocols
- consulting with other operators of climbing on artificial climbing structures
- reviewing standard operational procedures
- reviewing past incident reports and lessons learned.

Assess all hazards to identify which are significant. Align assessment and rating systems with current good practice and take into account the nature and context of the activity.

2.2   Managing hazards

Manage hazards according to the 'eliminate, isolate, minimise' hierarchy of action. Due to the nature of providing climbing on artificial structures, the hazards involving clients usually cannot be eliminated, and can only be minimised.

Use hazard management to reduce the risk of harm to acceptable levels. What these acceptable levels are will depend on the nature and context of the activity, client ability, and current good practice.

Managing hazards includes monitoring them for changes in their significance. A higher level of management, such as moving from minimising to eliminating, may be necessary if a hazard increases in significance, eg a client who is not behaving safely while belaying is no longer be permitted to belay.

2.3   Managing the hazard of drugs and alcohol

The Adventure Activity regulations explicitly require operators to manage the drug and alcohol-related risks in their workplaces, starting with a clear drugs and alcohol policy. Auditors will expect to see a policy suited to the risk within the operator's workplace, and evidence that it is being implemented.

> To see the WorkSafe guidance document on managing drugs and alcohol-related risk in adventure activities go to:
>
> www.business.govt.nz/worksafe/information-guidance/all-guidance-items/guidance-for-managing-drug-and-alcohol-related-risks-in-adventure-activities

2.4   Using competent persons

Use suitably competent people to identify, assess, and manage hazards.

Ensure the competent person is familiar with the operator's safety management system, client market, relevant information about the artificial climbing structure, and has access to historical information on hazards and incidents.

2.5   Incident reporting and learning

Report, record, analyse, and provide feedback on all incidents and concerns that affect safety or have the potential to affect safety. This is done to enable learning and to help stop the incident from happening again. Act on anything you learn.

Incident reporting systems need to be used effectively. Induction and ongoing training are vital, but are only a part of ensuring that this happens. The system must be openly and regularly used, particularly by senior staff, to have any chance of success.

To encourage responsible reporting, take care to think of reporting and recording separately from the incidents themselves. Avoid penalising people for reporting incidents. Good reporting and recording should be seen as positive behaviour alongside whatever faults may have led to an incident.

> For more information on hazard management processes go to
> www.supportadventure.co.nz/safety-management-plans/hazards
>
> For more information on incident reporting go to
> www.supportadventure.co.nz/safety-management-plans/incidents

Section 3: Design and Build

The artificial climbing structure (ACS) itself has potential to cause serious harm – impact or entrapment injuries due to structure component failure, impact injuries associated with unsafe wall surface or climbing route design, and impact injuries related to landing on hard or uneven surfaces. Focus design and build safety management strategies on preventing these from occurring.

It is also important that ACS design mitigates against the public climbing without staff knowing.

This section identifies good practice safety management strategies for dealing with these key aspects of ACS design and build:

- ensuring the ACS has structural integrity
- design of activity specific areas and minimising distractions
- design of climbing routes
- design of belay and anchor systems
- padding of fall zones
- hanger dimensions and positioning of lead anchors.

Note: For information on activity based risks and hazards see section 5.

This section refers to Australian Standard 2316.1:2009 (AS 2316.1:2009), which can be found at www.saiglobal.com

Additional recommendations have also been made to reflect the wide range of climbing offered by the New Zealand ACS sector, and the health and safety legislation's requirement to take all practicable steps to manage hazards.

Photo: The Roxx. Lee Howell

The information in this section should not be considered all-inclusive. It is essential to carry out hazard management processes for an ACS and the activity, and for staff to conduct ongoing dynamic hazard identification, assessment, and management.

For information on equipment choice, use, testing, and maintenance see section 9.
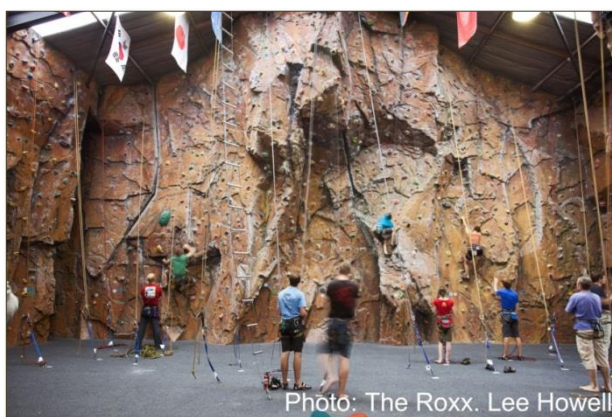
3.1 Ensuring the ACS has structural integrity

Ensure the ACS complies with the New Zealand Building Code, and that this compliance includes an engineer's check. Include all sub-structures such as abseil towers and platforms.

Take into account expected loadings and pull forces as per the recommendations in AS 2316.1:2009 sections 2.1[1] and 2.2. Include surface integrity in these checks. Note that surface ability to handle

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[1] Where AS 2316.1-2009 refers to Australian standards for building materials, use the corresponding New Zealand standards.

expected pull forces and impact will be influenced by the type of support behind the wall. 17mm plywood is an example of a minimum strength surface material.

Ensure the ACS surface shape is suited to climbing and is not hazardous to climbers in the event of a fall. See AS 2316.1:2009 section 2.8.

Guidance on assessing pre-existing ACSs for structural integrity and climbing activity suitability can be found in Appendix 2.

3.2   Design of activity specific areas

Providing climbing routes in the same area as others can contribute to serious harm falling accidents. Factors to consider include belayers and climbers ineffectively using or attaching to belay systems, and climbers falling on or interfering with other climbers or belayers.

Design the ACS to ensure that:

- autobelay and manual belay attachments look markedly different and areas are clearly separated – consider reinforcing the distinction with signage and barriers
- areas used primarily for bouldering are separated from those used for roped climbing
- climbing will not cause harm to non-climbers/spectators and vice versa.

Spectators and non-climbing entertainment such as videos and children's play areas can distract belayers and climbers and contribute to serious harm falling accidents. Ensure that ACS design minimises such distractions.

3.3   Design of belay and anchor systems

Unsafe belay or anchor system design can contribute to serious harm falling accidents. Factors to consider include anchor system failure, and belayers and climbers ineffectively using belay systems or incorrectly attaching to belay systems.

Strategies for ensuring belay and anchor systems are effective include:

- ensuring any objects that rope or synthetic tape runs over or is threaded through have a minimum curve radius as per AS 2316.1:2009 section 2.5
- providing and configuring belay systems as per AS 2316.1:2009 section 2.4
- ensuring that belay attachment systems are uncluttered
- attaching top rope climbers to the rope with two attachment points, eg a rethreaded figure of eight and a carabiner, and ensuring any carabiners are locking carabiners
- verifying that lead climbers and autobelay climbers[2] using a direct tie-in are competent to do so
- belaying off ground anchors, unless lead climbing, and ensuring the belayer is attached to the belay system

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[2] Current technology does not enable two points of attachment with autobelay systems. For autobelay safety management strategies, see section 5.1.

- ensuring ground anchors are designed to a strength limit state load of 7.5KN[3] and anchor bolts in concrete are installed using a locking compound or locking type nut

- considering adding friction to top rope belay systems if using non-assisted braking belay devices, such as extra rope wraps around the top anchor bar or one-way pulleys at the top of the climb, particularly for level 1 belayers (see section 8.3 for more information on level 1 belayers).

3.4   Design of climbing routes

Poorly designed climbing routes can lead to climbers falling onto others, causing others to fall or suffering hard impacts. Factors to consider include route and fall direction, placement of lead anchors, and position of ground anchor belays.

Strategies for designing safe climbing routes include:

- maintaining a minimum distance between bottom of ropes of 700mm

- establishing a maximum overhang size to limit pendulum falls

- positioning fixed floor anchors relative to top anchors to ensure that climbers do not descend on to belayers or swing into them in a low pendulum fall

- reducing low pendulums by redirecting the rope.

3.5   Padding of fall zones

Poorly padded fall zones can contribute to serious harm injuries. Factors include insufficiently thick or absorbent padding, unsafe joins between pads, and insufficient coverage of fall zones. Identify fall zones and ensure they are sufficiently padded. Fall zones extend to at least two metres out from the highest or most extreme point of a bouldering area.

Photo:The Roxx. Lee Howell

Note: Concrete is a particularly hazardous fall zone surface.

Strategies for managing the impact suffered in fall zones include:

- identifying the fall zones in all climbing areas

- following the recommendations in AS 2316:2009 section 2.9

- using padding that is of sufficient type and thickness to absorb impact from falls – 40mm absorbent foam is commonly used in belayed areas, with 200mm being more common in bouldering fall zones.

3.6   Hanger dimensions and positioning of lead bolts

Incorrect placement of lead bolts can cause falling climbers to hit the ground. The height of the first bolt placement and the spacing between it and subsequent bolts is particularly important. Safe anchor or hanger dimensions are also crucial as they impact on the loading of equipment.

Strategies for ensuring lead bolts are positioned safely and hanger dimensions are safe include:

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[3] This recommendation is based on an engineering report.

- following the recommendations for first bolt placement and hanger dimensions in AS 2316.1:2009 section 2.4

- using a competent person to check and approve subsequent lead bolt placements for their ability to protect from a ground fall or other hard impact before their use with clients.

Section 4: Climbing Session Management

Climbing session management includes ensuring each climbing session is staffed and monitored effectively and that the most practicable communications systems are in place.

4.1 Staff knowledge of the facility and activities

Ensure staff are familiar with the hazards of the facility and its activities, and with the operator's standard operating and emergency procedures. Factors to consider include:

- the role and safety responsibilities of the staff member
- the size of the facility and complexity of the supervision system.

4.2 Climbing session monitoring

Ensure that every climbing session has a staff member who is responsible for monitoring general safety and ensuring the session is managed according to the operator's SOPs.

This person should be an experienced staff member who the operator is confident will exercise good judgement under pressure.

Note: This does not remove the responsibility for each individual staff member to fulfil their role within the facility's supervision system. For more information, see section 8.

Some facilities provide unsupervised climbing areas for hire. Ensure clients are aware that they are not supervised when using these areas, and whether or not they can expect emergency support from ACS staff. Ensure they understand the increased responsibility this places on them. Ensure these areas are distinctly separate from supervised areas. Options include:

- clear and prominent signage
- physical distance
- physical barriers.

4.3 Communication systems – mobile structures

Ensure there is a communication system that enables staff to contact external emergency support. ACSs will generally have a landline, but mobile climbing structures may be used in locations where landlines are not available.

Use the most effective communication system practicable, eg a cellular phone or a satellite phone. Ideally, it should be two-way. If using a communication device that relies on coverage, ensure that staff are aware of coverage and non-coverage areas.

Ensure there is a backup system available if the primary system is likely to be compromised, such as getting wet or suffering from impact damage.

Limited communication options can affect access to emergency support. See section 10.2 for information on contingencies for limited access to external emergency support.

Section 5: Climbing Activities

The most likely climbing activity serious harm injuries are impact injuries from incorrect belaying. Focus safety management strategies on preventing these from occurring. Although lead climbing and lead belaying safety skills are acknowledged as being more technically difficult than those for top roped climbing, either done incorrectly could cause serious harm.

This section looks at four common climbing on artificial structure activities. It identifies the significant hazards they often involve and good practice for managing those hazards. The four activities are:

- roped climbing
- belaying
- bouldering
- abseiling.

The information in this section should not be considered all-inclusive. It is essential to carry out facility and activity specific hazard management processes, and for staff to conduct ongoing dynamic hazard identification, assessment, and management. Additional sources of information and technical expert advice on managing climbing include NZOIA and the New Zealand Mountain Guides Association (NZMGA).

The most common non-serious harm injuries while climbing at artificial climbing structures are:

- sprains due to poorly managed landings
- soft-tissue injuries associated with a lack of warming up before climbing
- poorly managed climbing and pre-existing injuries.

Note: The other most likely causes of serious harm are associated with the design and build of the ACS – impact or entrapment injuries due to structure component failure, impact injuries associated with unsafe wall surface or climbing route design, and impact injuries related to landing on hard or uneven surfaces. For recommendations for managing these risks, see section 3.

5.1   Roped climbing

This section covers risks associated with all types of roped climbing, and those specific to lead and autobelayed climbing. All roped climbing involves the risk of falling from height and suspension trauma, with lead and autobelayed climbing having additional unique hazards.

Also see section 5.3, which describes strategies for managing risk associated with belaying.

All types of roped climbing

The information in this section applies to all types of roped climbing, such as top roping, lead climbing, and autobelayed climbing.

Identifying the hazards

Factors to consider when identifying hazards for climbers participating in roped climbing include:

- climbing too high without a rope

- using safety equipment incorrectly, such as harnesses and rope attachment systems
- climbing too quickly for the belayer, particularly in the first two metres off the ground – creating slack rope in the system
- ineffective communication of safety information between climber and belayer
- climbing off route – pendulum falls and interference with other climbers
- putting fingers into hangers – seriously straining fingers or falling and de-gloving fingers
- pulling hard on small holds with cold fingers or hands.

Managing the hazards

Include strategies for managing hazards in ACS design and build, technical systems, client briefings and skill checks.

Technical systems

Establish a maximum height for climbing without belay – ensure climbers are belayed above that height.

Ensure climbing routes are clearly identifiable, eg include using colour coded holds, labelling climbs and leaving space between climbs.

See section 3 for information on design and build hazard management strategies – particularly the information on anchor and belay systems, ensuring ACS suitability for climbing activities, designing climbing routes, and padding fall zones.

Client management

Supervise climbers as per the recommendations in section 8.

Client briefings and checks

Conduct the checks and give the instructions in this section when training and assessing client competence for different levels of supervision, and during ongoing supervision.

- Check that climbers know how to attach to the rope and use the harness correctly, and have safety systems in place to check these before they climb – such as buddy checks and the 'three C's and a squeeze' test.
- Instruct climbers, either verbally or with signage, not to hold on to hangers.
- Ensure climbers know the importance of climbing at a speed suited to their belayer or belay system – do not 'out-climb' the rope.
- Ensure climbers and belayers use an effective safety communication system (climbing calls), particularly before starting to climb and starting to lower.
- Consider reminding climbers to warm up before climbing, particularly before use of training aids such as finger boards – options include signage and verbal briefings.
- Ensure that climbers' clothing does not interfere with easy visual inspection of their attachment to the system or closing of carabiners.

Lead Climbing

Lead climbing involves an increased risk of falling from height and requires a higher level of technical skill than top roping. This section looks at managing the risks specific to the climber's role.

Identifying the hazards

Factors to consider when identifying hazards for lead climbers include:

Photo: The Roxx. Lee Howell

- unsafe clipping techniques such as z-clipping, back-clipping, and long clipping when low

- climbing past bolts without clipping

- poor rope management such as having the rope between the legs

- falling unsafely, causing rope burn to legs or an uncontrolled impact against the wall

- top-roping off unsuitable anchor systems – single bolts or single non-locking carabiners

- unsuitable bolt spacing – first bolt too high and subsequent bolts spacing not protecting climbers from ground falls or heavy impacts against the wall.

Managing the hazards

Include strategies for managing hazards in ACS design and build, technical systems, client briefings, and skill checks.

Technical systems

Ensure that second climbers use suitable top rope anchors and attachments. Suitable anchors are outlined in AS 2316.1-2009 section 2.4.6, eg two bolts linked for load sharing. Suitable attachments include a locking attachment point or two opposing non-locking carabiners.

See section 3 for design and build hazard management strategies – particularly the information on positioning of lead anchors, hanger dimensions, and designing climbing routes.

Client management

Supervise climbers as per the recommendations in section 8.

Client briefings and checks

When assessing climbers for different levels of supervision and during ongoing supervision, ensure that they use safe rope management and falling techniques – such as not z-clipping or climbing past bolts without clipping, keeping their legs clear of the rope, and actively managing their impact against the wall during a fall.

Autobelayed climbing

Autobelayed activities are unique in roped climbing in that they do not use a person to belay. This decreases the risk in some areas but increases the risk of un-noticed incorrect attachment of the climber to the climbing system. This section looks at managing the risks specific to autobelaying.

Note: Currently, autobelay devices are deemed to be amusement devices.

Identifying the hazards

Factors to consider when identifying hazards for autobelayed climbing include:

- lack of a climbing partner for safety checks

- using the line attachment system incorrectly

- mistaking a top rope for an autobelay line – climbing without a belay

- climbing with a slack line – either due to climbing faster than the line retracts, the line becoming snagged on a hold, or a fault in the line retraction

- clothing becoming snagged on descent – climber suspended by clothing

- climbers descending or falling onto other clients.

Managing the hazards

Include strategies for managing hazards in technical systems, client briefings, and skill checks.

Technical systems

See section 3 for design and build hazard management strategies – particularly the information on designing climbing routes and padding fall zones.

Photo: The Roxx, Lee Howell

Ensure fall zones are clearly identifiable – use signage and/or verbal briefings.

Ensure there is prominent signage to remind clients to perform safety checks – particularly on correct climber attachment to the climbing system.

Client management

Supervise climbers as per the recommendations in section 8.

Ensure children aged less than 14 years old have their attachment point checked before climbing – this could be by a staff member or a person aged 14 or older who has been verified as competent to do so.

Client briefings and checks

Conduct the checks and give the instructions in this section when training and assessing client competence for different levels of supervision and during ongoing supervision.

- Emphasise the risk of not having a partner for safety checks, and the corresponding importance of diligent attachment techniques and personal safety checks.

- Ensure that climbers know how to attach to the autobelay system, and how to conduct a personal safety check, such as 'three C's and a squeeze'.

- Ensure that climbers understand how to identify an autobelay system versus a manual belay system.

- Brief climbers on what to do if slack develops in the line – such as stopping and, if the line does not tighten, call for help.

- Ensure climbers know the location of (or how to identify) fall zones and to stay clear of them.

- Brief climbers on the risks of loose clothing catching on the climbing surface, and ensure loose clothing such as hooded jackets and tops is safely managed.

5.2 Belaying

Ineffective belaying is the primary cause of serious harm during climbing– impact injuries associated with falling from height. Focus safety management strategies on preventing these from occurring. This section looks at risks common to all belaying, including top rope and lead belaying.

Photo: The Roxx. Lee Howell

Identifying the hazards

Factors to consider when identifying hazards for belaying include:

- the belayer using incorrect belay technique – particularly around managing the transfer from climbing to lowering, or not following the manufacturer's recommendations

- the belayer using safety equipment incorrectly, such as harnesses and rope attachment systems

- the belayer being distracted or not focusing on the task

- the belayer being unable to catch a fall due to mismatched size between the belayer and the faller

- ineffective communication between climber and belayer

- the belayer's hair or other loose items becoming jammed in the belay device

- 'slippery' new ropes – decreasing friction in the system.

Note: A significant contributing factor to belayers using incorrect belay technique is the perception that a belay device is self-locking. This occurs particularly with assisted braking belay devices such as the Petzl Grigri, Edelrid Eddy, and Trango Cinch. There have been a number of injuries and near misses due to incorrect use of these devices.

Managing the hazards

Include strategies for managing hazards in technical systems, client briefings, and skill checks.

Technical systems

See section 3 for design and build hazard management strategies – particularly the information on designing belay and anchor systems.

If the weight ratio between the climber and belayer could cause belayer movement during a fall, take extra care around the belayer's position – consider securing the belayer, adding friction to the system, or using a back-up belayer.

Clearly identify new ropes, eg use signage or labels.

Client management

Supervise belayers as per the recommendations in section 8.

Client briefings and checks

Conduct the checks and give the instructions in this section when training and assessing client competence for different levels of supervision and during ongoing supervision.

- Ensure the belayer attaches to the belay system correctly, uses the harness correctly, and has safety systems in place to check these before they belay – such as buddy checks and the 'three C's and a squeeze' test.

- Ensure the belayer uses a belay technique suited to the belay system and in accordance with manufacturers' instructions – particularly around managing the change over from climbing to lowering and catching a fall.

- Stress the importance of correct and diligent belaying techniques and the consequences of belay failure.

- Ensure climbers and belayers use an effective safety communication system (climbing calls), particularly before starting to climb and starting to lower.

- Ensure that belayers secure loose items such as hair and clothes so they do not interfere with belay devices, closing of carabiners, or easy visual inspection of the belayer's attachment to the system.

- Ensure that belayers are informed of the precautions to take if new ropes are in use – such as being particularly diligent when lowering due to less friction.

5.3 Bouldering

Bouldering exposes people to the risk of falling from height.

Identifying the hazards

Factors to consider when identifying hazards for bouldering include:

Photo: Extreme Edge, Jason Corban

- climbers climbing at heights where falling could cause serious harm

- climbers landing incorrectly – insufficient or unsuitable spotting, poor landing zone

- climbers or spotters interfering with roped climbing activities.

Managing the hazards

Include strategies for managing hazards in technical systems, client briefings and skill checks.

Technical systems

See section 3 for design and build hazard management strategies – particularly the information on padding of fall zones.

Use a clearly identifiable area specifically for bouldering, and have clear protocols for bouldering in areas outside this zone – such as roped climbers having right of way over traversing boulderers.
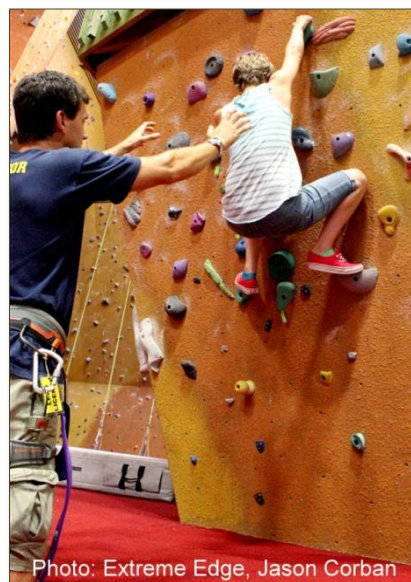
Establish an identifiable maximum bouldering height – such as a line painted along the wall or limiting the height of climbing holds on the wall.

Client management

Supervise boulderers as per the recommendations in section 8.

Ensure that fall zones are clear of bystanders and objects that could interfere with safe landings such as bags and climbing shoes.

Client briefings and checks

Conduct the checks in this section when assessing clients for different levels of supervision and during ongoing supervision.

- Ensure boulderers are informed of the maximum bouldering height, and that they climb below that height.
- Check that clients spotting boulderers are doing so safely.
- Ensure clients are aware of avoiding uncontrolled falls – options include using signage or verbal briefings.

5.4 Abseiling

Abseiling involves exposing clients and staff to edges and the risk of falling. This section looks at accessing and waiting on abseil platforms, and at abseiling specific safety management recommendations.

Additional sources of information and technical expert advice on managing abseiling include NZOIA and NZMGA.

Identifying the hazards

Factors to consider when identifying hazards for abseiling include:

- exposure of people to edges and falling
- incorrect client abseiling technique or equipment use
- exposure of ropes or anchor rigging to sharp or abrasive surfaces
- a difficult abseil starting area affecting the ease of weighting the rope and options to practise abseil technique
- abseiler suspended in harness for an extended period of time
- top-heavy clients – possibility of inverting while abseiling
- objects falling from above – landing on the abseiler or bystanders
- rope burn – abseiling at speed or holding the rope too tightly when abseiling.

Managing the hazards

Include strategies for managing these factors in technical systems, client management techniques, and client briefings.

Technical systems

Technical systems need to take into account equipment loadings, the time a client spends hanging in a harness, and abseiler ability.

- Protect ropes and webbing from sharp or abrasive surfaces – use edge protection such as padding or re-directing ropes.

- Ensure abseiling systems are releasable or include another option for recovering the abseiler in 'stuck' abseiler scenarios, eg include hauling systems or lowering using another rope.

- Ensure that abseil sites and starting point set ups to enable clients to safely weight the abseil rope

- Provide clients with equipment to maintain them in an upright position if staff think they may invert while abseiling.

- Keep the edge at the top of the abseil site clear of loose objects.

Ensure clients have a safety backup system while abseiling, eg a belayed by a staff member. Clients using self-managed backup systems such as prusiks will generally only occur in an instructional rather than a guided environment. Ensure the decision to allow a client to use a self-managed backup system or to check their own abseil device connection is made by a staff member verified as competent to do so. For information on verifying staff competence, see section 6.

See section 3 for design and build hazard management strategies – particularly the information on ensuring structural integrity of abseil towers and platforms.

5.5   Client management

Check the connection of each client's abseil device to the rope before they abseil.
Ensure the fall zone beneath the abseil is kept clear of bystanders

Client briefing
Instruct clients on appropriate abseil body position, and on techniques for speed control and braking.

Instruct clients to secure loose items, such as hair and clothing that could catch in the abseil device.

Accessing and waiting on abseil platforms

Manage the exposure to the risk of falling when people are accessing or waiting on the abseil platform. Ensure that people stay far enough away from edges to minimise the risk. This will often include establishing safe zones back from an edge and communicating these clearly to clients. Access to platforms is often managed by using stairways or other options that meet the Building Code.

Sometimes exposure to edges cannot be avoided. Belay clients and staff or attach them to a safety point when in the opinion of a technical expert or suitably qualified person:

- they are likely to fall and the fall is likely to cause serious harm, or

- a staff member needs to be attached in order to protect the client safely.

Assess the likelihood to fall by looking at factors such as:

- how close people are to the edge

- how much the surface slopes downward

- how unstable or slippery the surface is

- the ability of the client and staff member.

Section 6: Staff

Using competent staff is one of the keys to ensuring safety. This section looks at four key factors to consider when staffing your operation:

- identifying safety responsibilities and competence requirements
- verifying competence
- artificial climbing structure staff competence recommendations
- identifying and dealing with unsafe staff.

6.1   Safety responsibilities and competence requirements

Ensure the safety responsibilities and competence requirements of each job within the operation are correctly identified. These jobs should include being in sole charge of the ACS, operations management, client screening, and training and supervisory roles. Identify the skills and knowledge required to meet these responsibilities.

When identifying a job's competencies, factors to consider include:

- levels of experience and judgement
- personal technical skills, including equipment knowledge
- risk management, group management, and leadership skills
- ability to operate in accordance with the operation's SOPs
- familiarity with and understanding of the ACS operating environment
- ability to communicate safety requirements clearly to clients
- rescue and emergency management skills including first aid.[4]

6.2   Verifying competence

It is the responsibility of the operator to ensure that staff are competent. This section looks at how to use qualifications to verify skills, and how to verify those skills that are not covered by qualifications.

Using qualifications

Operators need to ensure they know which skills and knowledge a qualification actually measures, and then check these against those required for the job. Any skills or knowledge not covered by the qualification need to be verified by other suitable means. See the information later in this section.

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[4] Ensure the number of staff with first aid qualifications, and the type of qualifications they hold, are suitable for the likely first aid scenarios of the facility in use.

Verifying skills not covered by qualifications

Verify competence in skills not covered by qualifications using a measure that suits the degree of safety responsibility associated with the skills. Document the competence verification processes and results.

Use a suitable person to verify competence. Ensure this person has a qualification to do so, or is a technical expert in the skill to be verified and understands national expectations on the competence standard required.

Keep records of competence verification processes and results.

New qualifications

In 2013, NZOIA developed a wall climbing qualification and a sport climbing endorsement to the level 1 rock instructor award. For more information, contact NZOIA.

Establishing equivalency between qualifications

When establishing equivalency of one qualification with another (or parts of a qualification) an operator should contact the benchmark qualification provider and enquire as to the process they recommend.

> For more information on verifying staff competence go to
> www.supportadventure.co.nz/safety-management-plans/staff

Qualifications currently under review

Qualifications on the New Zealand Qualifications Authority (NZQA) Framework are currently being reviewed. Any results of this review that affect options for ACS specific competence verification will be included in this guideline as they become available. For more information on this review, go to www.skillsactive.org.nz

6.3 Staff competence recommendations

This section identifies competency requirements for safety responsibilities of ACS staff. It identifies the two core supervisory roles common to most ACS facilities – for the purposes of this guideline they are called Supervisor and Assistant Supervisor. There are several other safety responsible roles common to many facilities but dependent on the type of climbing the facility provides – for the purposes of this guideline, these roles are called Additional Supervisor Roles.

Specific qualifications

NZOIA provides a Climbing Wall Supervisor qualification along with an endorsement – Monitor Lead Climbing.

Broader qualifications

There are a number of broader qualifications that include technical competencies for one or more indoor climbing activities. They are NZOIA's climbing, canyoning, and caving qualifications; NZMGA's climbing qualifications; and Skills Active's qualifications (currently under review).

For more information on these qualifications, including more detailed skill breakdowns, experience prerequisites, and minimum recommended first aid certification, contact the administering organisation via their websites: www.nzoia.org.nz / www.nzmga.org.nz / www.skillsactive.org.nz

Check the information in this section and ensure that staff with corresponding safety responsibilities have their competence verified in the recommended competencies.

Note: There are likely to be other facility specific safety responsibilities. Ensure that these are identified and staff are competent as per the recommendations in sections 6.1 and 6.2.

Core supervision roles and competencies

This section outlines the safety related responsibilities, functions, and competencies of the Assistant Supervisor and Supervisor roles.

Note: Ensure there is always at least one staff member on duty at the facility verified as ~~competent~~ at the 'perform rescues' role – see the information later in this section on additional supervisor roles.

Assistant Supervisor

Purpose: To assist with the supervision of top rope climbing and bouldering clients whilst being supervised by a competent staff member.

Safety Responsibilities	Safety Functions	Safety Competencies
Assisting supervision and teaching of bouldering and top rope clients	Assist in monitoring clients whilst they are bouldering, top rope climbing, and/or belaying Fit harnesses Assist in teaching top rope climbers and belayers	Has knowledge of correct fit and use of different types of harnesses Can apply a system to fit and check harnesses and the facility's rope/belay attachment systems Has knowledge of correct use of different types of carabiners and belay devices. Can identify and correct incorrect top rope belay technique Can identify and correct dangerous bouldering practices Can apply their role within the facility's supervisory system Has good visual scanning skills

Supervisor

Purpose: To supervise basic climbing activity within the facility.

Note: To be in sole charge of a facility you must also have the Perform rescues competencies.

Safety Responsibilities	Safety Functions	Safety Competencies
Monitor and teach clients bouldering and top rope activities	Teach and check harness fitting and the facility's rope/belay attachment systems Teach and sign off top rope belaying Teach and sign off bouldering Monitor bouldering and top rope climbing and belaying	Can demonstrate climbing skills such as climbing a minimum of grade 16 in order to perform rescues Can apply a process to teach bouldering and top rope climbing and belaying skills Has knowledge of correct fit and use of different types of harnesses Can apply a system to fit and check harnesses and the facility's rope/belay attachment systems Can identify and correct dangerous bouldering and top roping practices for both climber and belayer/spotter Can apply their role within the facility's supervision system Has good visual scanning skills
Assess equipment	Conduct daily/pre-session equipment inspection Continually monitor all equipment in use	Can identify and manage dangerous equipment via repair, replacement, or isolation

Additional supervisor roles and competencies

This section outlines the safety related responsibilities, functions, and competencies of additional activity-specific supervisory roles.

Role: Perform rescues

Note: Ensure there is always at least one staff member on duty at the facility with these competencies.

Safety Responsibilities	Safety Functions	Safety Competencies
Responding to rescue scenarios	Perform rescues for all identified rescue scenarios	Can demonstrate rescues for all identified rescue scenarios including: • Jammed device • Stuck climber • Excessive slack rope in the belay system

Role: Monitor lead climbing on bolts

Safety Responsibilities	Safety Functions	Safety Competencies
Monitor lead climbing and belaying on bolts	Monitor lead climbing and belaying	Can identify and correct dangerous lead climbing and belaying

Role: Teach lead climbing on bolts

Safety Responsibilities	Safety Functions	Safety Competencies
Teach lead climbing and belaying on bolts	Teach and sign off lead climbing and belaying	Can demonstrate knowledge of current industry accepted practice in lead climbing on bolts Can apply a process to teach lead climbing and belaying for lead climbing on bolts Can identify and correct dangerous lead climbing and belaying on bolts

Role: Run abseiling sessions

Safety Responsibilities	Safety Functions	Safety Competencies
Monitor and teach abseiling	Teach abseiling Monitor an abseiling session	Can apply a process to teach abseiling Can apply a system to run an abseil session Can identify and correct dangerous abseiling techniques Can demonstrate rescues applicable to abseiling system in use

Role: Manage the operator's supervision system

Note: This role assumes there is more than one staff member. Ensure there is always at least one staff member on duty at the facility with the Perform Rescues competencies.

Safety Responsibilities	Safety Functions	Safety Competencies
Supervise staff	Delegate tasks to staff Monitor staff	Has strong communication skills Has good visual scanning skills
Manage the application of the facility's supervision system	Apply and oversee the facility's supervision system	Can apply and oversee the facility's supervision system

Role: Train staff

Key Areas	Safety Functions	Safety Competencies
Deliver staff training	Train staff to perform job role functions	Can demonstrate knowledge of job role functions Can apply a system to deliver staff training

Role: Assess staff

Key Areas	Safety Functions	Safety Competencies
Assess staff	Assess staff performance against an internal or external standard	Has knowledge of the standard applicable for the skills being assessed Can assess and provide feedback

6.4   Identifying and managing unsafe staff

Do not permit a staff member to supervise, instruct, or undertake other safety related tasks if they are in such a state of impairment that they may be a hazard to themselves or to any other person. Impairment could be due to factors such as alcohol, drugs, or fatigue.

Identify as a hazard any person's behaviour that indicates they are unable to perform safety tasks as required in their role.

Ensure management strategies suit the significance of the hazard and are outlined in the staff management aspects of the operator's safety management system. The Adventure Activities Regulations require that the drugs

 and alcohol hazard is specifically addressed through an explicit drugs and alcohol policy – this approach is encouraged for all operators of artificial climbing structures.

Initial hazard management for dealing with unsafe staff is to remove the person from the role requiring performance of safety tasks.

Also see section 7.6 for information on managing unsafe clients.

To see the WorkSafe NZ guidance document on managing drugs and alcohol-related risk in adventure activities go to:

www.business.govt.nz/healthandsafetygroup/information-guidance/all-guidance-items/guidance-for-managing-drug-and-alcohol-related-risks-in-adventure-activities

Section 7: Client Information

Managing safety is more effective if clients are well informed on the risks and safety requirements of participating in climbing at the facility. This section looks at the six key aspects of informing clients about safety:

- delivering safety information and checking understanding
- pre-activity risk disclosure
- general safety information
- safety information for specific activities
- using demonstrations and skill progressions
- identifying and managing unsafe clients.

7.1   Delivering safety information

Deliver safety information using a staff member who has been verified as competent to do so. Ideally this person would be experienced.

Ensure, as best as is practicable, that the client has understood the safety information. Have a safety information aid readily available for any client who has difficulty understanding the safety briefing, eg include practical demonstrations, videos, pictures and diagrams, or written instructions in the client's language.

7.2   Pre-activity risk disclosure

Before partaking in climbing inform every client of the following information:

- climbing involve risk of serious harm or death, particularly resulting from falling from height
- clients should be aware that the operator cannot guarantee the client's safety
- some climbing may be mentally and physically demanding and require the client to be comfortable and confident with the safety techniques involved.

7.3   General safety information

Inform all clients of facility safety procedures and rules before they participate in climbing activities. Factors to cover include:

- the importance of following staff instructions and facility rules – that this is critical to their safety and the safety of others using the facility
- the facility's supervision system and how it will apply to them, such as informing staff if they are moving from one level of supervision requirement to another – for guidance on supervision systems, see section 8
- the importance of technically correct and diligent belaying, the consequences of belay failure, and the importance of not distracting belayers and climbers
- designated activity areas, including how they can distinguish one area from another – for recommendations on distinguishing activity areas, see section 3
- general facility emergency exits, procedures, and associated health and safety information.

7.4   Safety information for specific activities

Inform clients on safety information for the specific activities they plan to participate in. The amount of information required will be influenced by the competence of the client. Clients should be informed of:

- significant hazards and warned of their dangers
- the techniques required to participate safely, such as procedures for using technical equipment and performing technical actions – for guidance on points to cover for specific activities, see section 5
- their degree of supervision for the activity.

7.5   Using demonstrations and skill progressions

When teaching technical safety actions, use demonstrations and skill progressions where practicable, particularly for belaying.

7.6   Identifying and managing unsafe clients

Do not permit a person to participate in climbing activities if staff believe the person is in such a state of impairment that they may be a hazard to themselves or to any other person. Impairment could be due to alcohol, drugs, or fatigue.

Identify as a hazard any client who is unable to perform safety procedures as outlined in safety briefings or who is unlikely to follow instructions. Management strategies should suit the significance of the risk and include directing the client towards less risky activities, increasing supervision levels, or excluding them from all climbing activities.

Also see section 6.4 for information on managing unsafe staff.

Section 8: Client Supervision

Suitable levels of client supervision are vital for safety at an ACS. Belaying and lead climbing are the activities most likely to involve serious harm, and both these activities require clients to be competent in technical skills. Providing suitable supervision for these activities should be a focus of the operator's supervision system.

This section looks at establishing a supervisory system, parameters for directly and indirectly supervising clients, supervising children, and supervising clients with climbing qualifications.

Note: For the purposes of this section, a 'rope' refers to all the clients actively using one climbing rope, eg one rope may involve a climber, a belayer, and a backup belayer.

8.1　Establishing a supervision system

Establish a supervision system that ensures all clients have a suitable level of supervision. Factors to take into account include:

Photo: The Roxx. Lee Howell

- staff competence

- client competence

- the number of clients

- the hazards of the activities offered

- the number and variety of activities offered

- the physical layout of the facility – particularly as it affects staff ability to see clients

- the type of equipment used

- the presence of bystanders – including clients who are waiting to climb or who have finished climbing

- things that may affect staff supervision performance such as fatigue and task repetition.

There are many variations of effective supervisory systems. Common options include designating staff members to supervise certain areas, specific client types, or certain activities. Ensure the supervision system includes:

- maximum numbers for the facility and minimum supervision levels

- designated areas within the facility for specific activities, such as bouldering and lead climbing

- clear supervision parameters for each role, such as areas of the facility, types of activities, indirect or direct supervision of clients

- key activity-specific actions requiring particular attention during direct supervision – see section 5

- strategies to enable staff to maintain the level of focus required to supervise effectively, such as timely breaks or moving from one activity to another

- clarity on procedures for ensuring supervision levels are maintained if staff take an unplanned break from their supervisory responsibilities, such as a toilet stop

- guidance on when the supervision system may need adjustment, such as an increase in the number of clients participating in an activity, an increase in the number of young children, an increase in the level of distraction, or less experienced or confident staff.

Ensure there is a staff member at the facility responsible for managing the supervision system. This person should be an experienced staff member who the operator is confident will exercise good judgement. For more information on climbing session management, see section 4.

8.2   Direct supervision

This section looks at who should be directly supervised, which actions require direct supervision, and recommended techniques and ratios for effective direct supervision.

For guidance on supervising children, see section 8.4.

Clients who require direct supervision

Directly supervise any client who staff feel is unlikely to perform an activity safely.

Directly supervise all belayers, top rope, and lead climbers until they are approved for indirect supervision – this includes clients new to the activity and those who profess to be competent but are new to the facility and whose competence is unknown to staff.

Actions that require direct supervision

Directly supervise clients anytime they are involved with climbing or being lowered – particularly when they are above three metres off the ground.

Note: The often quoted concept that no controls are needed where a person faces a three metre fall or less is incorrect.

There are two actions identified as being most commonly associated with serious harm injuries. Focus direct supervision on preventing these from occurring.

They are:

- incorrect attachment to the belay system
- incorrect belaying when transferring from climbing to lowering.

Each climbing activity, such as lead climbing or bouldering, has additional safety critical actions associated with a higher risk of client error. Ensure that direct supervision focuses on preventing these from occurring. For activity-specific information, see section 5.

Photo: The Roxx. Lee Howell

Techniques for effective direct supervision

Clearly identify clients requiring direct supervision. Options include the use of harness tags (see picture) and restricting clients to designated areas.

Effective direct supervision requires a sufficient number of staff to clients plus the use of safety management techniques such as:

- staging climbing so that not all ropes are involved in actions requiring direct supervision at once, eg asking three ropes to hold in a locked-off position while two other ropes weight the system at the top of a climb
- using back-up belayers, although the use of a client back-up belayer is not in itself grounds for moving to indirect supervision
- building the direct supervision area of the facility to enable increased physical access of the staff member to the ropes, such as concave walls.

Recommended minimum staff-to-rope direct supervision levels

The recommended supervision levels in this section do not take into account the use of trainee staff. Consider which hazard management tasks a trainee staff member is competent to perform before factoring them into supervision levels. For more information on verifying staff competence, see section 6.

The recommended range for staff to rope direct supervision is 1:4 to 1:6.

Note: If using 1:6 ratios, combine them with at least two of the safety management techniques for effective direct supervision as listed above.

Increase supervision levels when the operational situation is less than optimal. Guidance on these situations should be part of the operator's supervision system – see section 8.1 for more information on establishing a supervision system.

> For more information on establishing levels of supervision go to
> www.supportadventure.co.nz/safety-management-plans/clients

8.3   Indirect supervision

Focus indirect supervision on the actions outlined in section 8.2 and activity specific actions as identified in section 5. Indirect supervision involves staff scanning for unsafe situations and intervening as needed to maintain safety. Additional situations to look for include:

- unsafe general behaviour, eg distracting belayers or undertaking activities in non-designated areas
- bouldering in the lead climbing area
- unsafe equipment.

This section looks at ensuring client suitability for indirect supervision and the two levels of indirect supervision, including their associated supervision recommendations.

For guidance on supervising children, see section 8.4.

Ensuring client suitability for indirect supervision

Accept clients for indirect supervision if they have been checked by a staff member and the staff member is confident that, in the normal course of events, the client will participate in the activity safely.

Clients may be accepted for indirect supervision for one or more activities. Ensure they are clear as to what those activities are, and what to do if they change to an activity where they require direct supervision, eg top rope climbing and belaying, lead climbing and belaying.

Skills to check when assessing client suitability for indirect supervision

Skills to be checked when assessing client suitability for indirect supervision include the actions listed in section 8.2 and the activity specific client briefing and skill check recommendations made in section 5.

Ensure that the skills to be checked for each activity are outlined in the operator's safety management system.

How to check client suitability for indirect supervision

Check client skills using a staff member verified as competent to do so.

Check client skills during a directly supervised client demonstration unless one of the following conditions is met:

- a staff member who is competent to check client suitability for indirect supervision has previously observed the client perform the skills and is confident they will perform them correctly – this could have occurred during a climbing session at another location
- the facility has a record that the client has been previously accepted for indirect supervision – within a timeframe that gives assurance of skill currency
- the client has a recognised national qualification relevant to the skills to be checked – see section 8.5 for more information on supervising clients with qualifications.

Note: Methods of recording client skill checks include computer data systems and a personal licence with an expiry date. For more information, contact the working group members listed in the acknowledgement section of this guideline.

The two levels of indirect supervision – level 1 and level 2

It is acknowledged that some clients who are accepted for indirect supervision will be more competent at safety tasks than others. This means that, although they no longer require direct supervision, some will require a higher level of supervision than others.

For the purposes of this guideline there are two levels of indirect supervision; level 1 and level 2.

Level 1 supervision recommendations

A level 1 belayer or climber is one who has been accepted for indirect supervision, but who has little experience or confidence, or who for some reason staff think may not perform safety tasks correctly in adverse conditions. Adverse conditions include situations such as a distracting atmosphere or focusing for long periods of time while belaying a particularly slow-moving climber.

Safety management strategies for supervising level 1 climbers or belayers include:

- a higher level of supervision than that for level 2 climbers or belayers, eg increased visual scanning and staff proximity or assigning staff to supervision of level 1 clients
- a system to clearly identify level 1 clients, eg harness tags and designated climbing areas
- possible use of back-up belayers – train back-up belayers and note that the use of a back-up belayer is not in itself enough to move supervision levels to those of a level 2 client.

Level 2 supervision recommendations

A level 2 belayer or climber is one who has been accepted for indirect supervision and who staff have confidence will perform safety tasks correctly in both normal and adverse conditions.

They require supervision but may be less closely supervised than level 1 clients.

8.4   Supervising children

Establish minimum age guidance for supervision of children participating in climbing activities.

Recommended levels of supervision are:

Photo: YMCA Christchurch

- **Climbers younger than 14** – direct supervision.

  Note: For autobelayed activities this supervision may be provided by a caregiver aged 14 or over who is verified as competent to do so.

- **Belayers younger than 13** – direct supervision.

- **Level 2 indirect supervision** – 14 and over.

Some operators offer specific skill development programmes for children, such as those designed for climber athletes. Children involved with such programmes may be more competent and therefore require lower levels of supervision.

In New Zealand law, children under 14 require adult supervision in a general sense, irrespective of whether they are involved in climbing activities.

Many operators require guardian supervision or competence verification for participants younger than 16.

8.5   Supervising clients with qualifications

Clients who hold a nationally recognised climbing qualification may not need to be supervised if the qualification is current and covers the skills for indirect supervision as outlined in the operator's safety management system.

Ensure that the client agrees to operate independently and understands that they will be unsupervised.

This does not absolve the responsibility of the operator to ensure that:

- relevant safety information is shared as outlined in section 7

- the client is competent to participate unsupervised – operators may choose to sight the qualification, or they may require the client to demonstrate specific safety critical actions.

Section 9: Equipment

Ensure that equipment is suitable and in good condition. Base equipment choices on:

- the climbing available at the facility

- identified hazards and associated management strategies

- emergency scenarios and response plans.

This section looks at general use equipment, emergency equipment, and equipment maintenance, testing and inspection.

9.1   General use equipment

Use equipment according to the manufacturer's recommendations and current industry use. Ensure that equipment used within a system is compatible.

Use equipment that complies with relevant internationally or nationally recognised standards such as the International Mountaineering and Climbing Federation (UIAA) and the European Conformity (CE). Equipment should be manufactured specifically for climbing or abseiling.

This section looks at three key areas of general use equipment:

- equipment selection and use

- client equipment

- staff equipment.

Equipment selection and use

Select and use equipment in line with the recommendations in AS 2316.1:2009 sections 2.14.3–2.14.8, while noting that:

- Only use low elongated (static) rope when it is not expected to support a lead fall. Acceptable use includes abseiling.

- Most facilities in New Zealand use assisted braking belay devices for top rope belaying. If other devices are used, increase the levels of competence required for indirect supervision, and consider adding friction to the system – see section 3.3 for more information.

Ensure that autobelay equipment is purpose designed and certified by an engineer.

Client equipment

Client specific safety equipment supplied by a facility is commonly a climbing harness. Ensure that the harness is correctly fitted as per the manufacturer's instructions and, where relevant, that the client knows how to check the security and fit of the harness themselves.

Clients using their own personal safety equipment

Operators are responsible under health and safety legislation to take all practicable steps to ensure the safety of people at their facility. This responsibility exists when the operator provides safety equipment as well as when a client uses their own.

Methods of meeting this responsibility will be operation specific. Factors to consider include:

- clients signing a disclaimer cannot affect an operator's statutory duty and therefore has little or no effect in meeting an operator's responsibilities

- operators and staff cannot know the history or storage of client equipment and therefore, despite conducting checks, cannot be as assured of the safety of that equipment as they are of their own equipment

- clients need to be informed of and acknowledge the potential increase in risk associated with using their own equipment – options include verbal or written acknowledgements

- hands on or visual client equipment checks should be conducted by a staff member competent to do so – checking techniques and frequency will depend on factors such as the familiarity of staff with the client and their equipment.

Staff equipment

Ensure staff equipment is suitable, sufficient, and accessible as required by their role responsibilities for supervision and emergency scenarios. Accessible includes equipment on the staff member's person or in an equipment cache on the premises.

Staff equipment will commonly include:

- climbing harness
- locking carabiner
- cowstail or anchor chain
- climbing shoes.

Ensure staff have an effective method of quickly securing a live rope – options include ascenders or taking up the slack rope manually and quickly.

Route setting

Use a double rope system.

Ensure the route setter is independently attached to each rope and that the attachment on the working rope is a rescue-rated device.

You can see a description and pictures of this system, and the type of equipment required on the SupportAdventure website.

9.2   Emergency equipment

This section includes information on the accessibility of emergency equipment, general emergency equipment, and first aid supplies.

Accessibility of emergency equipment

Ensure that facility emergency equipment is suitably available and accessible. Whether equipment should be on a staff member's person or cached on the premises will be determined by the climbing activities on offer, the nature of the operator's supervision system, and identified emergency scenarios.

General emergency equipment and first aid supplies

Ensure that emergency equipment is sufficient and suitable for managing safety, based on identified emergency scenarios and their management. Items to consider include:

- locking carabiners
- an ascent device
- three prusiks of a length suitable for rescue use
- a knife or scissors suitable for cutting rope
- a climbing rope of a length suitable for rescues.

Note: Petzl Grigris are not rated for rescue eg for a pick off rescue from an access rope. Examples of ones that are rescue rated devices are Petzl ID, Petzl Rig, and ISC D4.

First aid supplies

Ensure that first aid supplies are suitable for the identified first aid scenarios of the activity. Suggestions for first aid kit contents can be found at www.supportadventure.co.nz/other-resources#firstaid

9.3   Equipment maintenance, testing, and inspection

Maintain, inspect, and test equipment regularly to ensure its reliability.

Ensure that maintenance, inspection, and testing techniques and schedules are consistent with manufacturers' recommendations and AS2316.1:2009 section 3.1, while noting the need to:

- ensure safety equipment is identifiable so that it can be tracked for purposes of inspection, maintenance, and retirement
- establish details of checks, taking into account manufacturers' recommendations and advice of a competent person
- conduct pre-activity inspections, as per AS 2316:2009 section 3.1 (b), at least each day that the facility is in use
- test newly installed climbing holds before client use to ensure they are secure and capable of supporting expected loads
- consider that the competent person carrying out the inspections may be involved in the daily operation of the facility, as long as their familiarity with the facility is managed so that it does not affect hazard assessment
- consider that some of the checks referenced under AS 2316.1:2009 section 3.1.1 (d) as annual inspections may be at intervals of up to two years if specified by a manufacturer or engineer.

Ensure inspection includes concealed components such as those in protective sleeves.

Proof testing anchors

Proof test top anchors as per the recommendations in AS 2316.1:2009 section 2.7.1 (a) and 2.7.2 (a).

Proof test ground anchors as per the recommendations in AS 2316.1:2009 section 3.1.2; ensure that single point, non-inspectable floor anchors are tested annually.

Conducting proof tests

Conduct tests using a person competent to do so – for routine testing this person may be involved in the day-to-day operation of the facility.

Apply proof test loads gradually and hold for at least two minutes.

Proof testing of anchors in concrete can weaken the substrate. To help manage this, ensure that loads are 50% of the strength limit state capacity of the anchors – this will be 3.75KN for a standard ground anchor and 5KN for a standard top anchor.

Note: the above two recommendations are based on engineering advice.

Section 10: Emergencies

Develop clearly documented and practised procedures for the full range of emergencies relevant to the operation – from incident management through to crisis response.

Train staff and ensure suitable equipment is available to manage each identified emergency scenario. For information on staff competence, see section 6; for information on emergency equipment, see section 9.2.

Climbing session monitoring and communication systems are key components of your safety management system. They feature in both normal daily procedures and procedures for managing emergencies, and are addressed in section 4.

This section looks at good practice for accessing suitable external emergency support.

10.1 Accessing emergency support

Ensure that suitable external emergency support is available within a planned period of time – specify this period of time within the operator's emergency procedures.

10.2 Contingencies for mobile structures

Where mobile structures are used in areas where access to suitable external emergency response is limited, injured clients may spend longer without secondary emergency care. This risk needs to be managed. Management strategies include:

- informing clients of the risk of a prolonged wait for emergency support in the event of an accident
- using more experienced guides or instructors and ensuring they are competent to manage identified emergency scenarios for an extended period of time
- considering increasing client supervision levels
- taking extra care and considering excluding avoidable higher risk activities such as lead climbing or lead belaying by inexperienced clients
- having resources available such as additional first aid equipment to manage an injured client for longer periods of time.

Section 11: Safety System Reviews

Regular internal and external safety system reviews or audits are a crucial part of running a safe operation.

Conduct an internal review, and possibly an external review, after an incident that caused serious harm, or might have caused serious harm.

Schedule internal reviews as part of the yearly safety routine – before and after the busy season are often good times. Factors to check include:

- safety systems and procedures are aligned with this guideline
- that the safety management plan accurately reflects the operator's systems and procedures
- that everyone in the operation follows the agreed safety procedures.

Ensure that someone in the operation is responsible for ensuring that reviews take place, and that everyone in the operation is responsible for being part of the process.

Record the process and the results, and share any relevant learning with staff and other ACS operators.

> For more information on safety system reviews go to
> www.supportadventure.co.nz/safety-management-plans/checking-your-systems

Appendix 1: Health and Safety Terms

The guideline uses several terms you need to understand to be sure you comply with the health and safety legislation. This appendix looks at those terms, and what they mean for managing hazards.

The terms are:

- practicable steps
- hazards and significant hazards
- serious harm.

All practicable steps

The health and safety legislation says you must take all practicable steps to safely provide adventure activities. You must take all steps that are reasonably practicable in the circumstances considering:

- the nature and severity of any injury or harm that may occur
- the likelihood of that harm occurring
- how much is known about the potential harm and the measures for eliminating, isolating or minimising the hazard from which the harm may arise
- the availability and cost of those measures.

Note: The 'circumstances' are those that an operator knows about, or ought reasonably to know about, taking into account good practice and knowledge throughout the adventure and outdoor sector.

The operator is responsible for balancing the likelihood and seriousness of potential harm against the cost, effort, and effectiveness of measures.

Where there is a risk of serious or frequent injury or harm, a greater cost in the provision of safeguards may be reasonable. If there are significant hazards and the measures are too expensive, unavailable, or ineffective, the only reasonable safeguard might be to cancel the activity.

Any judgement of whether a safeguard was reasonably practicable will take into account good practice and knowledge throughout the industry.

> The SupportAdventure website has a guide – 'Health and Safety Act Made Easy'
> www.supportadventure.co.nz/health-safetylegislation/health-safety-act-made-easy

Hazards and significant hazards

The Act says an adventure activity operator must take all practicable steps to systematically and regularly identify, assess, and manage significant hazards. Hazards that are not significant also need to be managed and this process may be applicable to those hazards too.

'Hazard' describes a danger or a potential source of danger. It is anything that does or could cause harm including harm due to exposure to the hazard over time. So a hazard may be:

- always present, such as a sharp edge that may injure or snag a client or equipment

- potentially present, such as water levels that might rise after rain, or guide fatigue.

'Significance' is a combination of the likelihood of the potential harm and the seriousness – how bad the harm could be if it occurs, even if it is unlikely to happen.

The Act defines 'significant hazard' as a hazard that does or could cause:

- serious harm; or
- harm due to exposure over time; or
- harm that does not usually occur or become apparent until a significant time after exposure to the hazard.

Note: A hazard may include a person's behaviour including the effects of drugs and alcohol use, and physical or mental fatigue.

> For more information on hazards and hazard management go to
> www.supportadventure.co.nz/safety-management-plans/hazards

Serious harm

Harm is illness, injury or both, and includes physical and mental harm. Serious harm is death, or harm of a kind defined to be serious for the purposes of the Health and Safety in Employment Act 1992. The Act does not give a simple definition of serious harm, but gives examples including:

- death
- conditions that result in permanent loss of bodily function, or temporary severe loss of bodily function such as eye injuries or bone fractures
- loss of consciousness from lack of oxygen
- harm that requires hospitalisation for 48 hours or more.

Hazards that could result in harm other than serious harm also need to be managed. The most common minor injuries associated with climbing on artificial structures are sprains due to poorly managed landings, soft tissue injuries associated with a lack of warming up before climbing, poorly managed climbing and pre-existing injuries. Managing the hazards associated with these injuries reduces the likelihood of both minor injuries and unexpected serious harm.

> To read the Health and Safety legislation definition of serious harm go to
> www.supportadventure.co.nz/health-safetylegislation/health-safety-act-made-easy

Appendix 2: Checking Structures

Verify that existing artificial climbing structures (ACSs) have structural integrity and are suitable for climbing activities. This involves checking the ACS design, build, and current condition. This appendix describes good practice for undertaking these checks.

Checking design and build

Proof of design and build suitability may be achieved via the manufacturers' instructions, building consents, or engineers' reports. Ensure that such documentation has taken into account peak forces likely to be generated by climbing activities.

If none of the above documents are available, check the ACS as described in the topic below. Use an engineer, registered builder, or climbing wall designer[5] who has an understanding of the peak forces likely to be generated by climbing activities.

Checking current condition

Check the current condition of existing ACSs by carrying out an inspection as outlined in AS 2316.1–2009 section 3.1.1 (d) and the anchor testing recommendations in section 3.1.2. Ensure the check of anchors includes sighting current records of, or undertaking the following:

- proof testing of top anchors
- proof testing of floor anchors
- proof testing of the first three lead anchor points on lead climbs to 8KN (for a strength limit state load of 9.9KN)
- checking that spacing between lead anchors is consistent with recommendations in AS 2316.1:2009 section 2.4.5.

For the initial check, operators should consider using a person who is not involved in the day-to-day operation of the facility. This is in order to mitigate the risk of familiarity with the structure influencing their inspection. Ongoing annual checks and anchor proof testing by facility staff is acceptable if they are competent to carry out the required tasks.

Use the above inspection and the recommendations in AS 2316.1:2009 section 3.1.1 (d) and 3.1.2. to inform the frequency and focus of future checks.

Managing areas with limited access for inspection

Some ACSs include areas that are difficult to get behind and visually inspect. Identify this as a risk and ensure those areas receive regular surface inspections by a person competent to do so. Design new ACSs so that thorough visual inspection is possible.

Note: Visual inspection of top anchors is vital. Ensure that this occurs.

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[5] Where a climbing wall designer is used, ensure they incorporate checks against engineering and building standards, and that they are competent to do so.