

HEALTH AND SAFETY FOR ARTIFICIAL  
**CLIMBING**  
STRUCTURES AND OPERATIONS

FOR DESIGNERS, MANUFACTURES, SUPPLIERS, OPERATORS AND USERS



**GUIDE** 2002  
WorkCover NSW Health and Safety Guide

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## Purpose

This Health and Safety Guide provides practical guidance to designers, manufacturers, suppliers, operators and user groups of indoor and outdoor Artificial Climbing Structures (ACS).

It is designed to help them meet their obligations under the NSW Occupational Health and Safety Act 2000 (the Act) and the Occupational Health and Safety Regulation 2001 (the Regulation) by ensuring the occupational health and safety of employees, participants and others at a climbing facility.

Its main purpose is to provide guidance on ways to control potential hazards that participants may be exposed to while taking part in climbing activities at a climbing facility. The application of these controls should also reduce the risks to employees and others at the climbing facility.

This guide is applicable to climbing facilities that provide top roping and/or lead climbing experiences.

## Background

This Safety Guide replaces an earlier guide issued in January 2001. It follows a review of a number of climbing facilities in NSW for compliance with the earlier guide. Two associations, Australian Climbing Gyms Association (ACGA) and Indoor Rockclimbing Gyms Of Australia (IRGOA), and other industry groups were involved in developing this Safety Guide.

## General requirements

### a) Operators

Under the Act and the Regulation, all employers (including the operator of a climbing facility) have a duty to ensure the safety of their employees and other people at the workplace. The operator of a climbing facility must also ensure that participants and others are not exposed to risks arising from the activities at the workplace, including climbing.

Operators have duties in their capacity as controllers of the premises to ensure that they are safe and without risks to health.

These responsibilities include conducting a risk assessment of the premises and climbing facility operation to consider foreseeable risks to employees, participants and others and to implement measures to eliminate or control such risks.

Sections 8 and 10 of the Act and Chapter 4 of the Regulation provide details of the requirements for employers and controllers of premises.

## b) Designers/Manufacturers/Suppliers

Designers, manufacturers and suppliers of ACS and climbing equipment also have a responsibility under the Act and the Regulation to ensure the plant and equipment is safe and without risk when properly used. Additionally, they must provide information that is necessary to enable the plant to be used properly. Again, this is achieved via the risk management path of hazard identification, risk assessment and the implementation of control measures. Section 11 of the Act and Chapter 5 of the Regulation provide details on the requirements in relation to designers, manufacturers, suppliers and plant.

## Definitions

Anchor	An attachment point on the ACS or the ground to protect the climber during their progress on the ACS. It can be fixed or moveable and includes anchors for top rope belay, protection anchors for lead climbing and floor anchors to secure the belayer. (Note: an anchor is termed a "protection point" in EN 12572)
Artificial Climbing Structure (ACS)	A purpose-built climbing structure, or an existing structure purposefully modified for climbing purposes. The structure may be moveable or fixed.
Climbing Facility	The premises, operational areas including the ACS and associated equipment, used by participants when undertaking activities involving climbing or belaying.
Competent Person	For any task means a person who has acquired through training, qualification or experience, or a combination of them, the knowledge and skills to carry out that task. (Definition from OH&S Regulation 2001)
Risk Assessment	The overall process of hazard identification, risk analysis and risk evaluation.
Risk Management	The systematic application of management policies, procedures and practices to the tasks of identifying, assessing, eliminating, controlling and monitoring risk.

## Specific control measures

Various elements of climbing facility operations have been identified as having hazards, with associated risks to participants, for which appropriate control measures have been determined.

It should be noted that not every aspect of a climbing facility's operation, including the design and construction of an ACS, has been covered in this guide. Reference should therefore be made to other available guidance materials where necessary. Compliance with the recommendations in this document alone does not necessarily ensure that obligations under the Act and the Regulation have been complied with.

There is no WorkCover NSW accredited course for this activity so WorkCover does not have a list of course providers. The associations, ACGA and IRGOA, may be able to provide advice on potential providers.

The significant hazards and recommended minimum control measures that have been determined are classified into the elements outlined below.

1. The ACS including anchorage system
2. Flooring – energy absorption
3. Climber attachment method
4. Belay systems and connection
5. Equipment inspection and maintenance
6. Belay/climber instruction and assessment
7. Belay/climber supervision
8. Staff training, competency and assessment
9. First aid and emergency procedures

Note: It is the combination of all of the above elements that provides the health and safety factors required for operation of a climbing facility. Therefore the above elements are not in priority order, and there are additional elements that have not been considered in this document, e.g. electrical safety.

# 1. THE ACS INCLUDING THE ANCHORAGE SYSTEM

## 1.1 Design and construction

Purpose-built ACS, or the alterations to convert an existing structure to an ACS, should be designed, constructed and tested in accordance with *EN12572:1998 Artificial Climbing Structures – Protection points, stability requirements and test methods*. Existing structures should comply with the intent of this standard, i.e. the installation should take the required loadings for the intended purpose as an ACS.

The installation, construction and testing of the ACS, including the anchor system, should be undertaken by a competent person(s). The competent person(s) must have the skill, knowledge or background related to the type of installation in use.

## 1.2 Anchor hazard

The design of the rope anchorage system on the wall, roof or other structure should be such that it is not possible to install the rope in a manner that cannot sustain the required loadings.

For example, if a connector is fitted to prevent sideways movement of the rope, it should not fail if the suspension rope were inadvertently connected to it. Where there is a structure or a fitting nearby that could be mistaken for an anchorage, it should be removed or appropriate signage displayed, e.g. a nearby fire sprinkler pipe or roof bracing elements.

## 1.3 Certification

A certificate of proof testing in accordance with EN 12572:1998 should be provided and available for inspection. For the anchors this should include identification of all the individual components in place at the time of testing.

If the ACS is attached to existing building structures these should also be appropriately certified as to their structural integrity to take the loading from the ACS.

A competent person(s) should provide certification.

# 2. FLOORING

## 2.1 Energy absorption

The floor in the potential impact zone should be covered in an energy absorbent (impact attenuating) material (as per clause 2.2 below). This is to reduce the likelihood and severity of injuries if the belayer were to lower the climber too rapidly or if the climber were to descend uncontrolled at the start of the climb before the belayer has taken up sufficient slack.

The area of floor coverage should be at least 2 metres out from the wall, overhang, roof anchor, climbing rope or climbing ladder where provided.

For horizontal structures, such as roof traverses, it may not be practical to provide an energy absorbent zone under the central area. If a risk assessment shows it is not practical then additional hazard control measures, such as friction pulleys, protection points, and competency checks on the belayer/climber as well as additional supervision should be implemented.

## 2.2 Standard AS/NZS 4422:1996

Australian Standard *AS/NZS 4422:1996 Playground surfacing – Specifications, requirements and test method*, should be used to reference the requirements of the material and testing specifications. While the forward to the Standard states that it is not directly relevant for potential long bone injuries it is the only standard that gives some relation between potential injury and the energy absorbing properties of the impact surface.

It is considered that compliance with this standard, for a 1.5 metre fall, should significantly reduce the risk of serious injury for the uncontrolled descents described in clause 2.1 above. The manufacturer/supplier or a competent person should provide certification for the flooring attenuation as having a critical fall height of 1.5 metres or greater in accordance with AS4422:1996.

Note: This level of energy absorption may not prevent serious injuries should a climber fall from further up the climb.

Where provision of energy absorbent material is impractical, e.g. in infrequently used outdoor locations, each belayer should be directly supervised on a one-on-one basis while they are belaying a climber. Belaying by competent facility staff is deemed equivalent to one-on-one supervision. Alternatively, other methods may be implemented to ensure that the climber is not injured by impact with the floor or ground.

# 3. CLIMBER ATTACHMENT METHOD

Connection of the climber's harness to the belay rope should not rely on a single screw-gate karabiner, as it could be left undone or undo itself during the climb. Where a karabiner is used as the primary connection it should be as a dual attachment method, i.e. provided with a back-up connection.

One such system is the "clip and tie" method. This does not preclude the climbing facility operator from including the use of a single knotted connection, as used in outdoor or lead climbing, as part of their procedures so long as the participants are also assessed for competency in tying and checking the knots and are adequately supervised. One such knot is the "rethreaded figure 8".

The climbing facility operator should implement and enforce procedures for connection and belaying to be used by all climbers and belayers. Where the operator permits a range of different connection or belaying procedures the supervisors need to be competent in supervising all such procedures.

# 4. BELAY SYSTEMS AND CONNECTION

## 4.1 Identification

All belay stations or individual pieces of equipment should be readily identifiable from the ground, e.g. each belay station numbered or colour coded, or each component tagged.

## 4.2 Friction devices

Devices that increase rope friction may be useful to assist the belayer in controlling climber descent. However, they should not be considered as a substitute for adequate belaying and energy absorbent flooring.

Operators should follow manufacturers guidelines in relation to installation, use, inspection and maintenance of such devices. Risk assessment should also be conducted to determine that there are no additional hazards introduced with the use of such devices.

## 4.3 Non-anchored belayers

Additional assessment of the participants should be undertaken and consideration given to the relative weights of the belayer and climber and belay equipment being used.

# 5. EQUIPMENT

## INSPECTION AND MAINTENANCE

### 5.1 Equipment logbook (or register)

An equipment logbook, also known as a register or log, should be provided and used to assist in the systematic inspection and maintenance of the equipment within the climbing facility. The logbook should contain sufficient information to identify the item and the history of the item within the facility, e.g. date put into service, inspection dates and results, maintenance actions, repairs and, finally, removal from service and discard.

The logbook can be a book or a computer based register. In either case it should be kept for an appropriate length of time as deemed adequate by business record keeping requirements.

### 5.2 Equipment inspection

All equipment should be regularly inspected. All inspection, maintenance and repairs should be recorded in the equipment logbook or register.

The frequency of inspection, maintenance and repair should be determined by manufacturers recommendations and a risk management approach based on factors such as, frequency of use and history of past wear and tear. Inspections may be divided into daily checks and more infrequent inspections, which are more thorough.

Each piece of equipment within a system should be individually identifiable to allow recording of relevant information in the equipment logbook. Alternatively, a piece of equipment may be permanently allocated to a particular belay station or connected to another individually identifiable piece of equipment.

All inspection, maintenance and repair work should be conducted by a competent person. If doubt exists as to the adequacy of the item or its repair, it should be removed from service and advice sought from the manufacturer/supplier.

### 5.3 Belay ropes

All climbing ropes in top-rope systems should be certified by the manufacturer as suitable for single rope belay purposes. Appropriate standards include *EN 892 Dynamic mountaineering ropes* and *EN 1891 Personal protective equipment for the prevention of falls from a height – Low stretch kernmantle ropes*.

All climbing ropes in lead climbing systems should be certified by the manufacturer as suitable for this purpose. An appropriate standard is EN 892. Single, twin or half ropes may be used depending on the individual climbing facility's policy and procedures.

## 5.4 Karabiners

Karabiners used as part of a personal protection system to connect the climber and belayer to the belay station should have a dual opening action, i.e. with manual locking or automatic locking gate, and be certified for such use by the manufacturer.

Karabiners on the lower ends of quickdraws (narrow webbing slings) attached to lead climbing protection points may be single action (e.g. spring-gate) karabiners.

Karabiners used as solid connections between equipment and the ASC should be a dual action karabiner or a semi-permanent connection such as a tube nut connector (e.g. maillon rapide) or locked shackle, certified by the manufacturer as suitable for supporting persons.

## 5.5 Harnesses

Harnesses should be of a commercially manufactured type, and comply with a recognised climbing harness standard, such as *EN 12277 Mountaineering equipment, harnesses, safety requirements and test methods* or UIAA specifications.

Climbing facilities should follow supplier/manufacturer recommendations in terms of harness use, length of service, maintenance and repair. However, even if in apparent good condition, harnesses that have been in use for 5 years should be discarded as some deterioration is difficult to detect visually. Each harness should be uniquely identifiable and the date it was put into service recorded in the equipment register or log.

## 5.6 Customer supplied equipment

Climbing facilities should implement a procedure for dealing with the issue of customer-supplied equipment. Some options are:

- a) Visual inspection of customer supplied equipment to check for obvious visual defects prior to its use within their facility,
- b) A system for climbers/belayers to check their own equipment and sign-off;
- c) A policy of no use of customer equipment.

Note: Where customer supplied equipment is permitted, staff should be adequately trained and competent in the climbing facility's procedures.

## 5.7 Anchorages re-certification inspections

Re-certification inspections of the anchorage system for the ACS should be undertaken on a regular basis following initial installation and certification. A risk management approach should be used to determine the regularity of additional inspections based on such factors as frequency of use, location, years in service, and general wear and tear observed in the anchorage system. Such inspections should not be greater than 2 years for an indoor ACS and 1 year for an outdoor ACS.

Anchorages using chemical or friction anchorages should be proof tested to EN12572: 1998 as part of their re-certification requirements.

Re-certification inspections should be conducted by a competent person. It may be an advantage to use someone independent of the facility.

# 6. BELAYER/CLIMBER

## INSTRUCTION AND ASSESSMENT

### 6.1 General

Each belayer/climber should be instructed on the site procedures, including connecting and belaying. They should have their competency assessed as satisfactory on their first visit to the site prior to climbing/belaying without direct supervision by an appropriate climbing facility employee, regardless of their claimed experience.

Participants' competence should be assessed to determine the level that they will participate in during their visit. This assessment should be recorded. Participants should be advised of the level of participation permitted, and that reassessment by the facility must be undertaken before progressing to higher levels of participation. Reassessments should also be recorded.

Climbing facilities should implement a procedure for identifying and dealing with a client who has not used the facility for some time. Options include formally reassessing the individual's competency and a less formal approach of increased supervision until satisfied with their competency.

Note: it is the safety aspects of harness use and connection, belaying and facility specific procedures that need to be assessed rather than the participant's ability to 'climb'.

### 6.2 Signage

Climbing facilities should display, for participants' information, relevant extracts of policies and procedures, relating to the facility's operations and use. As a minimum, these should include the belaying procedures and the policy relating to the use of customer supplied equipment.

# 7. BELAYER/CLIMBER SUPERVISION

The level of ongoing supervision provided should be sufficient to detect and correct the use of improper procedures. Direct supervision on a one-on-one basis may be required when energy absorbent material is not used (see 2.2) and no other method is implemented to ensure that the climber is not injured by impact with the floor or ground.

Appropriate levels of supervision will depend on a number of factors such as:

- layout of the facility and number of belay stations available
- number of participants
- ability and experience of participants
- age of participants
- special needs groups
- other mandatory requirements e.g. Department of Education supervision ratios
- experience of supervisors.

To assist in determining the provision of adequate supervision levels, groups should be encouraged to book in advance. Information regarding the numbers, age group, ability and any special needs should be recorded. Consideration should also be made of the facility's previous utilisation, including the time of year (including school holidays) and the likely weather conditions.

Participants should be supervised by facility staff on the floor in a position to view all users. Sufficient staff should be available to ensure continuous line of sight supervision, allowing for any staff performing other duties, including instruction and assessment.

Only the number of participants that can be adequately supervised should be permitted to use the climbing facility at any time.

# 8. STAFF TRAINING, COMPETENCY AND ASSESSMENT

All staff must be provided with appropriate induction training and more specific training and assessment in relation to the required competencies for their position within the facility. Clause 13 of the Regulation provides details of the requirements.

Staff responsible for instruction and supervision of participants should be competent to follow the facility's procedures for instruction, including spotting deficiencies in participant technique and emergency rescue response.

Staff responsible for equipment inspection and maintenance should be assessed as competent to undertake these duties.

All assessments should be recorded. For consistency and transferability within the industry, assessment by industry recognised external assessors would be advantageous.

Note: Various organisations may provide training and or assessment for competency.

# 9. FIRST AID AND EMERGENCY PROCEDURES

## 9.1 First aid

Due to the number of likely participants and staff on site, trained first aid personnel and either a 'Kit A' or 'Kit B' should be provided at climbing facilities. Clause 20 of the Regulation contains the requirements for provision of first aid kits and trained first aid personnel.

## 9.2 Emergency procedures

Facilities should have emergency procedures in place for dealing with reasonably foreseeable emergencies, such as fire and bomb threat, including activity specific emergency rescue. All staff should be adequately trained in these procedures. Clause 17 of the Regulation provides details on these requirements.

## **Additional information**

There are two associations covering the wall climbing industry. Their contact details are:

Australian Climbing Gyms Association

Address: PO Box 3361, Parramatta NSW 2124

Phone: (02) 9609 5853

Fax: (02) 9729 0723

Email: [info@austclimbinggyms.com.au](mailto:info@austclimbinggyms.com.au)

Indoor Rockclimbing Gyms Of Australia

Address: PO Box 431, Box Hill Vic 3128

Phone: (03) 9877 0377

Fax: (03) 9894 3023

Email: [irgoa@ozemail.com.au](mailto:irgoa@ozemail.com.au)

## **Relevant standards and industry reference material**

Australian New Zealand Standard AS/NZS 4422:1996 Playground Surfacing – Specifications, requirements and test method.

European Standard EN 12572:1998 Artificial Climbing Structures – Protection points, stability requirements and test methods.

European Standard EN 892 Mountaineering Equipment – Dynamic mountaineering ropes – Safety requirements, testing, marking.

European Standard EN 1891 – Personal protective equipment for the prevention of falls from a height – Low stretch kernmantle ropes.

European Standard EN 12277 - Mountaineering equipment. Harnesses. Safety requirements and test methods

## **Relevant WorkCover publications**

The following WorkCover publications are available from the WorkCover website via the links shown.

The Act - <http://www.workcover.nsw.gov.au/pdf/2000-40.pdf>

The Regulation (with margin notes), summaries of the Act and the Regulation, various Codes of practice and other publications to assist in implementing the Act and the Regulation are available at:

<http://www.workcover.nsw.gov.au/html/publications.asp>

Further Information and Advice: For further information about this matter please contact WorkCover's Information Centre on 13 10 50