



Route-setting and Maintenance

Fall Protection Management

*Note: this plan is based on Alberta workplace regulations as of October, 2010.
Not all jurisdictions have similar standards.*

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Overview

1.1 Climbing Gym Industry Specifics

As part of a climbing gym employee's general work duties, he or she may be required to periodically perform a variety of route-setting or maintenance tasks. Because this work often occurs at heights of over 3 meters from the floor surface, both employer and employees are responsible for ensuring that appropriate fall protection systems are being used to decrease the likelihood that a worker will suffer injury or death in the event of a fall.

Some general guidelines for working at heights include:

- Workers working at heights cannot work alone
- Workers working at height of over 3 meters must use an appropriate fall protection system
- A rescue system must be available to rescue a worker who has fallen or is for whatever reason unable to rescue themselves
- Personal protective equipment must meet industry standards, be inspected regularly and be disposed of if damaged in any way
- Workers and potential rescuers must be appropriately trained prior to using a fall protection system

The systems outlined in this document are specific to the climbing gym setting and the equipment used differs from that frequently used by rope access workers in other industries. The systems take advantage of the fact that climbing gyms typically have a wide variety of climbing specific personal protective equipment available and are commonly equipped with engineered over head anchors and ground anchors.

Hazard Assessment

2.1 Potential Hazards

Potential hazards include:

- Workers falling from heights greater than 3 meters
- Workers suffering from 'harness hang syndrome'
- Workers being struck by falling objects
- Personal protective equipment failure

2.2 Control Techniques

Control techniques to mitigate the potential hazards include:

- Workers working at heights above 3 meters must use an appropriate fall protection system
- All fall protection systems used will allow for timely rescue of a worker who is unconscious or for whatever reason unable to rescue themselves
- Workers working in areas where there is the risk of objects falling from above must wear approved head protection
- All tools must be secured to the worker anytime he or she completing work at heights
- All personal protective equipment must be inspected in accordance with manufacturer guidelines and disposed of if damaged in any way
- Systematic checks must be conducted prior to the use of any fall protection system to ensure the system and equipment are set up correctly

Personal Protective Equipment (PPE)

3.1 Harnesses

Harnesses must be either CE or UIAA approved, possess an integral belay loop and be in good repair. When possible and practical, using a chest harnesses in addition to a sit harness or a full body harness may be preferable to decrease the likelihood of the worker inverting in a fall.

3.2 Ropes and slings

Ropes must be either CE or UIAA approved dynamic climbing ropes a minimum of 10 millimeters in diameter and in good repair. Slings should be CE or UIAA approved and in good repair.

3.3 Ascending and Descending Devices

Mechanical ascending and descending devices must be CE or UIAA approved and in good repair. Mechanical ascenders and camming style belay devices should be used for all fall protection systems.

3.4 Carabiners

Carabiners must be CE or UIAA approved and in good repair. Triple action locking carabiners must be used at all critical attachment points within the fall protection system.

3.5 Head Protection

Head protection in the form of a climbing helmet must be CE or UIAA approved and in good repair. Industrial hard hats may be used in lieu of climbing helmets as long as they meet CANSI standards and are in good repair.

3.6 Eye Protection

Protective eyewear should be worn as required and must meet CANSI standards.

Knots and Anchors

4.1 Knots

Workers who will be tying into the climbing rope directly as part of their fall protection system should use the standard figure eight follow through knot.

For fall protection systems that require the rope to be configured as a closed loop, the Flemish bend should be used to tie the two ends of the rope together.

Fixed focal points for floor based anchors should be created with a figure eight on a bight.

4.2 Tie offs

Tying off camming style belay devices needs to be done in a manner that is releasable even under a load. This can be achieved by tying a slipknot in the brake rope below the belay device followed by an overhand on a bight in the bight of rope created by the slip knot.

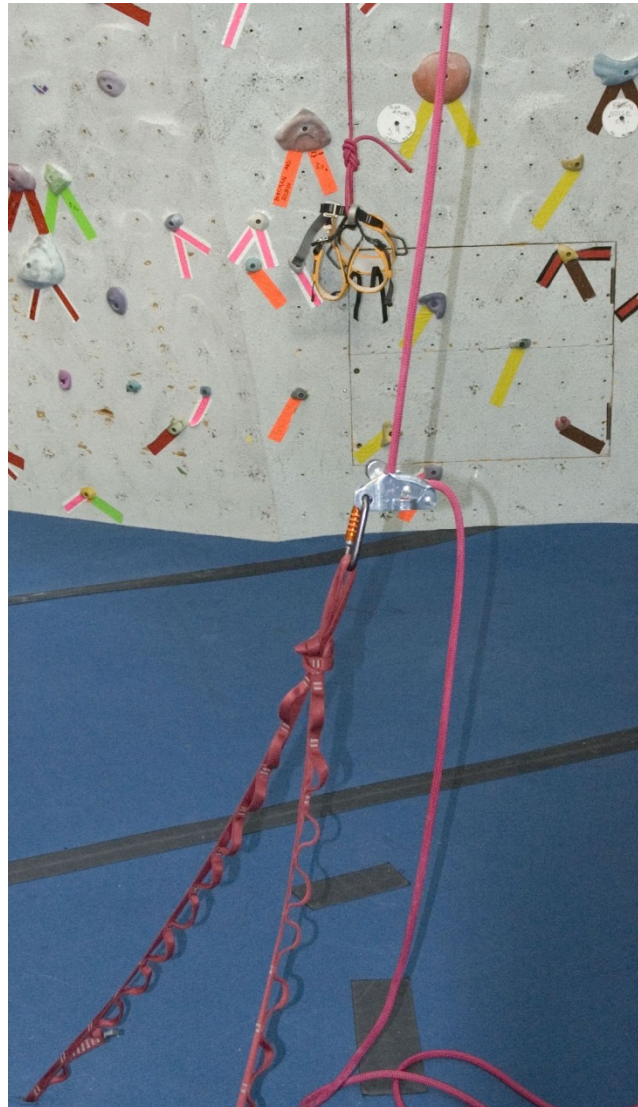


4.3 Anchors

Both overhead and ground anchors must be constructed off permanent fixed anchor points. Anchors need to incorporate a minimum of two fixed anchor points each capable of withstanding a minimum load of 16kn.

Fall Protection Systems

5.1 Ground Anchored Belay System



Overview:

The ground anchored belay system can be used to complete routesetting and maintenance work at heights greater than 3 meters when appropriate overhead and ground anchors are present and there are sufficient holds on the wall to allow the worker to climb upwards to complete required work. The system is similar to that used for top rope climbing with the exception that the worker is belayed directly from the floor anchor which allows the belayer more mobility as he or she is not directly connected to the fall protection system. It also allows for the worker to forerun any portion of a route while routesetting.

Fall Protection System Assembly:

1. Construct an appropriate ground anchor from a minimum of two fixed anchor points.
2. Connect the camming style belay device to the focal point of the ground anchor with a triple action locking carabiner.
3. The worker ties into the climbing rope with a figure eight follow through knot through the tie in point of an approved harness.
4. Both the worker and the belayer complete an inspection of the fall protection system set up.
5. The worker is belayed to the height where the work will be completed at which point the belayer may tie off the camming style belay device.
6. The tie off can be released and the worker may be belayed or lowered as required.

Fall Protection System Inspection:

- All personal protective equipment is inspected before the fall protection system is assembled.
- Once the system is assembled, a self and partner check of all components of the system is conducted. This includes; fitting of the harness, construction of the floor anchor, the belay set up and the figure eight follow through knot.

Rescue Procedures:

1. Release the belay tie off if required.
2. Lower the worker to the ground.

5.2 Ground Anchored Ascent System



Overview:

The ground anchored ascent system can be used to complete routesetting and maintenance work at heights greater than 3 meters when appropriate overhead and ground anchors are present. This system is commonly used when there are not sufficient holds on the wall to allow the worker to climb and they must therefore ascend a rope. Because this system only allows for the worker to be lowered from the ground anchor and not belayed, it is not an acceptable system for workers to use to forerun while routesetting.

Fall Protection System Assembly:

1. Construct an appropriate ground anchor from a minimum of two fixed anchor points.
2. Create a closed loop by tying the two ends of the climbing rope together with a Flemish bend.
3. Connect the camming style belay device to the focal point of the ground anchor with a triple action locking carabiner. The Flemish bend needs to be positioned on the load side of the belay device and as close to the belay device as possible so that the worker can be lowered to the ground if required, without the knot jamming against the top anchor.

4. Tie off the brake rope below the belay device using a slipknot in the brake rope below the belay device followed by an overhand on a bight in the bight of rope created by the slip knot.
5. A second camming style belay device is placed on the load rope at the point where the worker will begin his or her ascent and connected to the worker's belay loop with a triple action locking carabiner.
6. A mechanical ascender is placed on the rope above the second camming style belay device.
7. A 120cm sewn sling is girth hitched through the tie in points of the worker's harness and connected to the ascender with a triple action locking carabiner.
8. A foot loop or etrier is connected to the ascender in the same carabiner as the sewn sling from the worker's harness.
9. Both the worker and the belayer complete an inspection of the fall protection system set up.
10. The worker ascends the rope to the height where the work will be completed.
11. The worker can tie off the camming style belay device at his/her harness, remove the ascender and lower his or herself with the camming style belay device or be lowered from the ground anchored belay device. If the worker needs to stop mid-descent to complete more work the camming style belay device should be tied off any time the worker will not be controlling the brake rope.

Fall Protection System Inspection:

- All personal protective equipment is inspected before the fall protection system is assembled.
- Once the system is assembled, a self and partner check of all components of the system is conducted. This includes; fitting of the harness, construction of the floor anchor, the ground anchored belay set up and tie off and the complete ascending system the worker will use.

Rescue Procedures:

1. Release the belay tie off.
2. Lower the worker to the ground.

5.3 Self Anchored Ascent System



Overview:

The self anchored ascent system can be used to complete routesetting and maintenance work at heights greater than 3 meters when an appropriate overhead anchor is present; however there are no appropriate ground anchors. Sufficient holds to climb are not required on the wall where the worker will be working as he or she will be ascending the rope; however an adjacent rope with sufficient holds on the wall for a rescuer to climb to the worker is required to effectuate a timely rescue of the worker if required.

Fall Protection System Assembly:

1. The worker ties into one end of the climbing rope with a figure eight follow through knot through his or her tie in points.
2. A camming style belay device is placed on the belay rope at the point where the worker will begin his or her ascent and connected to the worker's belay loop with a triple action locking carabiner.
3. A mechanical ascender is placed on the rope above the camming style belay device.
4. A 120cm sewn sling is girth hitched through the tie in points of the worker's harness and connected to the ascender with a triple action locking carabiner.

5. A foot loop or etrier is connected to the ascender in the same carabiner as the sewn sling from the worker's harness.
6. Both the worker and a co-worker complete an inspection of the fall protection system set up.
7. The worker ascends the rope to the height where the work will be completed.
8. The worker can tie off the camming style belay device at his/her harness, remove the ascender and lower his or herself with the camming style belay device to the ground. If the worker needs to stop mid-descent to complete more work the camming style belay device should be tied off any time the worker will not be controlling the brake rope.

Fall Protection System Inspection:

- All personal protective equipment is inspected before the fall protection system is assembled.
- Once the system is assembled, a self and partner check of all components of the system is conducted. This includes; fitting of the harness, the figure eight follow through knot and the complete ascending system the worker will use.

Rescue Procedures:

1. Two co-workers set up to top rope climb on a rope adjacent to the worker in need of rescue.
2. The worker conducting the rescue girth hitches a 120cm sewn sling to their tie in points and connects a triple action locking carabiner to the other end of the sling.
3. The worker conducting the rescue is belayed as he or she climbs up to the worker requiring rescue.
4. The worker conducting the rescue connects the sewn sling that is girth hitched to their harness to the belay loop of the worker requiring rescue's harness with the triple action locking carabiner
5. The worker conducting the rescue removes the ascender that the worker requiring rescue was using to ascend.
6. The worker conducting the rescue lowers the worker requiring rescue on their belay device while the worker conducting the rescue is lowered simultaneously by his or her belayer on the ground.