



1. Introduction

1.1. Purpose

The purpose of the Fall Protection Program is to outline that the University of Alberta (U of A) believes that protection from falls is a fundamental right and responsibility when working at elevations. This Program has been developed to meet the requirements of *Part 9 – Fall Protection in the Alberta Occupational Health and Safety (AB OHS) Code*.

A fall protection system must be utilized if a worker may fall:

- at a temporary or permanent work area, a vertical distance of 3 metres (10 ft.) or more,
- at a temporary or permanent work area, a vertical distance of less than 3 metres (10 ft.) if there is an unusual possibility of injury,
- at a temporary or permanent work area, into or onto a hazardous substance or object, or through an opening in a work surface, or
- at a permanent work area, a vertical distance of more than 1.2 metres (4 ft.) and less than 3 metres (10 ft.).

NOTE: An unusual possibility of injury refers to the potential for a worker to sustain injuries more serious than those likely to result from landing on a solid, flat surface.

1.1.1 Fall Protection and Working Alone

The U of A requires a minimum of 2 people to be present at all times when the use of a travel restraint or fall arrest system is required (Buddy System).

1.2. Scope

The Fall Protection Program is intended to provide the required processes to help protect:

- Full- or part-time employees employed by the University of Alberta.
- Temporary employees placed by an outside agency to work at the University of Alberta's premises.
- Contractors engaged to perform work at the University of Alberta's premises.
- Volunteers who work at the University of Alberta's premises for free.
- Workers employed by prime contractors, contractors, and subcontractors to perform work at the University of Alberta's premises under a contract with the University of Alberta.

This Fall Protection Program does not address the requirements for high angle rescue, industrial rope access, safety nets, suspended personnel baskets, stationary mobile cranes, and bucket trucks.



Exceptions

Rescue personnel involved in training or in providing emergency rescue services may use equipment and practices other than those specified in this Program, CSA Standards or Alberta OHS regulatory requirements.

NOTE: If rescue personnel are required for a potential fall arrest emergency, when needed contact HSE to assist in the development of a rescue plan through an approved external agency.

2. RESPONSIBILITIES

Each person is responsible for protecting their own, as well as each other's health and safety. All employees are to know their role and comply with the requirements of their position.

If any point in time additional assistance is required or there are questions related to the Fall Protection Program please contact your supervisor or request assistance from HSE.

2.1. Senior Management

The following positions are considered senior management:

- Associate Vice President
- Directors

Senior management's responsibilities within the Fall Protection Program include, but are not limited, to the following:

- Establish and maintain a comprehensive Fall Protection Program in alignment with the *AB OHS Code Part 9 – Fall Protection* and the University of Alberta requirements.
- Ensure the allocation of adequate resources, including personnel, training, and equipment, for the effective implementation and maintenance of the Fall Protection Program.
- Provide leadership and support for the effective implementation of fall protection measures throughout the organization.
- Collaborate with management and the Health and Safety Representative to address fall protection concerns and improve workplace safety culture.
- Conduct regular reviews and evaluations of the Fall Protection Program to identify areas for improvement and ensure compliance with AB OHS regulations.
- Allocate necessary budget and resources for the procurement and maintenance of fall protection equipment.
- Ensure all incidents, near misses, and hazards related to fall protection are reported, investigated, and addressed promptly.



2.2 Management

The following positions are considered management:

- Managers

Management's responsibilities within the Fall Protection Program include, but are not limited, to the following:

- Implement and enforce fall protection policies and procedures within their respective business areas.
- Support senior management in allocating resources and implementing the fall protection program effectively.
- Ensure workers who must work at heights have completed approved third party fall protection training.
- Ensure that supervisors receive adequate training and support to oversee fall protection measures within their areas of responsibility.
- Collaborate with senior management to develop and communicate organizational policies and procedures related to fall protection.
- Assist in conducting regular reviews and evaluations of the Fall Protection Program and contribute to identifying areas for improvement.
- Provide support and guidance to supervisors and workers in addressing fall protection concerns and implementing corrective actions.
- Allocate resources as needed to address fall protection hazards and maintain compliance with AB OHS regulations.
- Conduct regular inspections and audits of work areas, equipment, and procedures to assess compliance with the requirements of *Part 9 – Fall Protection in the AB OHS Code* and identify any deficiencies or non-compliance issues.
- Lead or assist in the investigation of fall-related incidents and near misses.
- Encourage open communication and participation from all levels of the organization regarding fall protection issues and safety initiatives.
- Conduct thorough risk assessments and hazard identification exercises to identify potential fall hazards in the workplace.
- Ensure that all fall protection equipment meets the standards and specifications outlined in *Part 9 - Fall Protection in the AB OHS Code* and is in good working condition.
- Ensure Fall Protection Equipment is maintained annually, as per manufacturer specifications.

2.3. Supervisors

The following positions are considered Supervisors

- Foreman



- Supervisors/Lead Hands/Crew Leads

NOTE: As per the Alberta OHS Act a supervisor is defined as a person who has charge of a work site or authority over a worker.

Supervision's responsibilities within the Fall Protection Program include, but are not limited, to the following:

- Lead by example by adhering to fall protection protocols and promoting a safety-conscious work environment.
- Implement and enforce fall protection policies and procedures within their areas of responsibility.
- Provide adequate training and supervision to workers regarding fall protection measures, including the proper use of equipment and safety protocols.
- Ensure a Fall Protection Plan is developed for all work at heights.
- Ensure applicable workers review, sign off on, understand and comply with the Fall Protection Plan(s) applicable to their work at heights.
- Conduct regular inspections of work areas to identify fall hazards and take corrective actions as necessary.
- Ensure that all workers under their supervision are competent to perform their tasks safely, including completing external Fall Protection Training and the proper use of fall protection equipment.
- Investigate all reports of incidents, near misses, or hazards related to fall protection, and report to management, as required.
- Encourage open communication and participation from workers regarding fall protection concerns and suggestions for improvement.
- Collaborate with management and the Health and Safety Representative to address fall protection issues and implement corrective actions.

2.4. Workers

The following positions are considered workers:

- Full- or part-time employees employed by the University of Alberta.
- Temporary employees placed by an outside agency to work at the University of Alberta's premises.
- Volunteers who work at the University of Alberta's premises for free.
- Workers employed by prime contractors, contractors, and subcontractors to perform work at the University of Alberta's premises under a contract with the University of Alberta.

Workers responsibilities within the Fall Protection Program include, but are not limited, to the following:



- Not work at heights or utilize fall protection equipment unless they have received approved fall protection training.
- Present their supervisor with a copy of their certified Fall Protection training certificate.
- Comply with all requirements of the Fall Protection Program and AB OHS legislative requirements.
- Participate in fall protection training programs provided and follow all established procedures and guidelines.
- Create, review and sign off on the Fall Protection Plan(s) applicable to their work at heights.
- Use fall protection equipment correctly and as instructed, including harnesses, lanyards, guardrails, and anchor points.
- Inspect fall protection equipment before each use to ensure it is in good condition and report any defects or concerns to supervision immediately.
- Report any hazards, unsafe conditions, near misses and incidents related to fall protection to supervision immediately.
- Follow established safe work practices when working at heights or in areas where fall hazards exist.
- Communicate with supervisors and management regarding potential fall hazards and collaborate on implementing control measures, as required.
- Take responsibility for their own safety and the safety of others by adhering to fall protection protocols and actively participating in safety initiatives.
- Participate in incident investigations and provide feedback on fall protection procedures to help improve the Fall Protection Program.

2.5. Prime Contractors, Contractors, and Subcontractors

Facilities and Operations will ensure that prime contractors, contractors and subcontractors protect their workers by implementing their Fall Protection Program and applicable processes and procedures that:

- Are suitable for the workplace and will provide the protection required for the tasks performed.
- Meets the requirements of Part 9 – Fall Protection in the AB OHS Code.

2.6. Health, Safety and Environment

Health, Safety and Environment responsibilities within the Fall Protection Program include, but are not limited, to the following:

- Provide expert guidance to management, supervisors, and workers on understanding and complying with the fall protection requirements outlined in *Part 9 - Fall Protection in the AB OHS Code*.
- Stay updated with any changes or amendments to *Part 9 - Fall Protection in the AB OHS Code* and ensure that the Fall Protection Program and practices align with the current regulations.



- Collaborate with senior management and relevant stakeholders to develop, implement, and maintain a comprehensive Fall Protection Program in accordance with the requirements of *Part 9 - Fall Protection in the AB OHS Code*.
- Assist in drafting procedures, processes and protocols specific to fall protection, including risk assessments, safe work practices, fall protection plans and equipment standards.
- Support and advice in the development of a rescue plan through an approved external agency in the event rescue personnel are required for a potential fall arrest emergency.
- Develop and deliver training sessions on fall protection awareness, procedures, and equipment usage for workers, supervisors, and management.
- Work with supervisors and workers to implement controls and mitigation measures to eliminate or minimize fall risks.
- Provide guidance on the selection, inspection, and maintenance of fall protection equipment, including harnesses, lanyards, lifelines, guardrails, and anchor points.
- Work with management and supervisors to address findings related to fall protection identified during inspections and audits and assist in the implementation of corrective actions as necessary.
- Compile incident reports, analyze root causes, and recommend corrective actions to prevent recurrence and improve overall fall protection measures.
- Proactively identify opportunities for improvement in the organization's fall protection program and practices based on industry best practices, lessons learned, and feedback from stakeholders.

3. TRAINING

Workers that have the potential to be exposed to a fall hazard must receive Fall Protection Training through an HSE approved [external training agency](#) prior to them starting any risk-of-fall work activities.

Fall protection training must be a minimum of 8 hours include the following:

- A review of current AB OHS legislation pertaining to fall protection.
- An understanding of what a Fall Protection Plan is.
- Fall protection methods a worker is required to use at a worksite.
- Identification of fall hazards.
- Assessment and selection of specific anchors that the worker may use.
- Instruction for the correct use of connecting hardware.
- Information about the effect of a fall on the human body including:
 - Maximum arresting force.
 - Suspension trauma.
- The purpose of shock and energy absorbers.
- Swing fall and free fall.
- Pre-use inspections.
- Emergency response procedures to be used at the worksite.



- Practice in inspecting, fitting, adjusting, and connecting fall protection systems and components.

In addition to the training described a worker must be made aware of the site specific fall hazards particular to that work site and the steps being taken to eliminate or control those hazards.

NOTE: Personnel expected to conduct a site rescue will be trained in the procedures and techniques to conduct such a rescue.

3.1. Retraining

Fall protection re-training may be conducted under the following situations:

- The current training certification has expired or is coming up on expiry (every 3 years).
- Changes in the workplace or AB OHS Legislation render previous training unacceptable or obsolete.
- Changes in the types of fall protection systems or in equipment to be used within the unit operations renders previous training unacceptable or obsolete.
- There have been observations of inadequacies in the required knowledge or use of fall protection equipment/systems.

4. HAZARDS

While there are several identified tasks where fall protection is normally required, every task undertaken by a worker can have inherent risks associated with it. It is the responsibility of the worker to complete a Hazard Assessment to assess their current task, the risk associated with it and what controls have been put in place to reduce and/or eliminate that risk. Identified fall hazards include:

Leading Edges - A leading edge is the unprotected end of formwork, floors, roofs, decks, or other walking or working surfaces. An unprotected edge presents a significant fall hazard to workers; therefore, workers must use some type of fall protection when working on or around leading edges. Fall protection can include a properly installed guardrail, a travel-restraint system, or a fall-arrest system.

Roll Out - When a force is applied on the top of a non-locking gate, the gate opens, releasing the mating hardware. The most typical rollouts have been known to occur between snap hooks and D-rings. Non-locking snap hooks are not to be used as part of a fall protection system. Any non-locking snap hook to be found in service, must be removed from service immediately and disposed of accordingly.

Swing Fall Hazard - Anchor selection and routing of lifelines over and around structures must take into consideration swing fall hazards. Ideally, work should be performed directly below the anchor. The further away a worker is from this ideal position, the greater the potential for the worker to swing like a pendulum into objects if they fall.



Gate Cross Loading - Snap hooks and carabiners are designed to handle maximum loads in line with their long axes. However, because of their shape or circumstances of use (e.g. loops of webbing or rope coming to rest across the gate and then being placed under tension) snap hooks and carabiners can be subjected to gate cross-loading, resulting in much lower breaking strengths. Connections between hardware components must be made carefully when using snap hooks and especially carabineers.

5. FALL PROTECTION EQUIPMENT

All fall protection equipment must be inspected, used, maintained, and stored in accordance with manufacturer's recommendations.

5.1 Lanyards

There are two different types of lanyards: positioning lanyards, which control where a worker is physically able to move to in order to keep them from entering a fall hazard zone, and shock absorbing lanyards which contain an energy-absorbing unit to limit fall arrest forces in the case of a fall. Lanyards used for fall arrest systems must contain a shock absorber that limits the arresting forces to 6 kN (1,349 lbs.) or less. Lanyards must meet the requirements of the most current edition of *CSA Standard Z259.11-17, Energy absorbers and lanyards for use, care, inspection, maintenance, and storage* at all times.

The following lanyard use guidelines must be adhered to:

- Two lanyards should never be connected to each other.
- A lanyard may only be woven through itself (one end woven through the other end) if it's specifically designed for this purpose. Read the manufacturer's tag to determine.
- If a shock absorber is used, connect it so that it is closest to the harness.
- Shock absorbers do not make it permissible to use inadequate anchor points.
- Additional clearance is required when using an energy absorber in any fall arrest system.
- Do not let lanyards run over a sharp edge or sharp bends.

5.2 Pack Style Shock Absorbing Lanyards

These are the most common types of lanyards used. The unique feature of a shock absorbing lanyard is that it has a pack which deploys in the event of a fall and expands the lanyard to ensure that the fall arrest force is significantly reduced.

5.3 Positioning Lanyards

These lanyards are made without shock absorbing properties and are used as positioning or restraint lanyards to eliminate the likelihood of a fall occurring. Non-shock absorbing lanyards are for fall restraint only and must not be used as a fall arrest connector.



5.4 Double Leg 100% Tie-off Lanyards

These are lanyards with two separate legs, connected at one end. These lanyards are used to allow a worker to have one leg of the lanyard attached to an anchor point and then move to another anchor point, attaching the other leg and then disengage the first connector, ensuring continual attachment to an anchor point by the worker.

5.5 Self-Retracting Lifelines (SRL)

A SRL is a vertical lifeline that, much like the seat belt in a car, pulls out and retracts easily. Subjected to a quick tug, however, an internal mechanism acts to engage a braking system. When the tension is released, the lifeline moves freely again. During a fall event, the SRL's internal braking system functions to disperse the energy of the fall over a short distance, therefore limiting the force applied to a worker's body. All SRLs will require a fall arrest indicator

There are 4 types of SRLs, defined as follows:

1. **Self-Retracting Lifeline (Class SRL).** Suitable for applications where:
 - The SRL is anchored at an elevation that limits free fall to the activation distance of the device.
 - The extracted lifeline cannot bear against an edge or surface during fall arrest.
2. **Self-Retracting Lifeline with integral rescue capability (Class SRL-R)**
 - Any SRL device provided with an integral means for assisted rescue (e.g. raising/lowering rescue subject).
3. **Self-Retracting Lifeline with leading edge capability (Class SRL-LE).** Suitable for applications where one or more of the following conditions are met:
 - Anchored lower than the elevation of the dorsal D-Ring on worker's full-body harness, and/or
 - The extracted lifeline can bear against an edge or surface during fall arrest.
4. **Self-Retracting Lifeline with leading edge and integral rescue capabilities (Class SRL-LE-R)**
 - Combination of 2 and 3.

NOTE: The type of SRL used for fall protection is based on the specific hazards of the location being worked in, and whether the equipment will be used to arrest a fall or used for travel restraint purposes only. Contact your supervisor for assistance, when required, in determining the correct SLR.

SRLs must meet the requirements of the most current edition of *CSA Standard Z259.2.2-17, Self-Retracting Devices* at all times.

5.6 Full Body Harness

A worker using a personal fall arrest system must wear and use a full body harness. A full body harness is a harness designed to hold the wearer upright in the event of a fall from height. If worn correctly, a full



body harness will distribute the energy generated during free-fall across the wearers' body evenly, reducing the potential for serious injury. Full body harnesses must meet the requirements of the most current edition of *CSA Standard CAN/CSA Z259.10-12, Full Body Harnesses for use, care, inspection, maintenance, and storage* at all times.

Full-body harnesses should be the first choice when it comes to working at height because they offer:

- Freedom of movement for the worker to get his or her job done.
- Support for all body parts including hips, legs, chest, and shoulders.

A full body harness should always:

- Be easy to use and easy to adjust.
- Fit the worker properly.
- Be free from damage, wear, or tear.
- Allow the worker to move freely and easily as they work.

Donning and Adjusting

One of the most basic (yet often most overlooked) practices of fall protection is the proper donning and adjusting of a harness. The following is the proper procedure when donning a full body harness.

Workers will be aware of the manufacture specifications for the harness they wear. If a harness is used solely by one worker, some of these steps may be skipped with ongoing use, once it has been adjusted to fit their body:

1. **Step 1:** Hang shoulder straps over shoulders (like a jacket). Always ensure that the sub-pelvic strap rests underneath your pelvic area.
2. **Step 2:** Connect the left leg strap and adjust the trap to fit snugly. Take your right hand and insert it between the left leg strap and your leg; if you can create a fist, the strap needs to be tightened. After the strap is properly tightened, check the sub-pelvic strap for proper tensioning.
3. **Step 3:** Repeat step 3 with opposite leg and opposite hand.
4. **Step 4:** Adjustment the front straps located below the chest strap, to increase or decrease the size of the harness.
5. **Step 5:** Attach chest strap and tighten until snug. Strap should be located mid-chest.
6. **Step 6:** Ensure the flat part of the Dorsal (back) D-ring is positioned between the base of your neck and your shoulder blades (you may need to adjust the harness multiple times to ensure the D-Ring is in the right position). Check the sub-pelvic strap for proper positioning.

Connecting Components

All connecting components of a fall arrest system consisting of carabiners, D-rings, O-rings, oval rings, self-locking connectors, and snap hooks must meet the requirements of the most current edition of



CSA Standard Z259.12-01, Connecting Components for Personal Fall Arrest Systems (PFAS) for use, care, inspection, maintenance, and storage at all times.

All carabineers or snap hooks must:

- be self-closing and self-locking,
- only be opened by at least two consecutive deliberate manual actions, and
- be marked with its breaking strength in the major axis, and the name or trademark of the manufacturer.

5.7 Anchor Straps / Wire Slings

Anchor straps can be installed as a permanent anchor during building construction and can also be used in temporary applications. Anchor straps are used to secure a lanyard and harness to an anchor point, such as an I-beam.

All wire rope slings used as an anchor strap must be terminated at both ends with a Flemish eye splice, rated to at least 90 percent of the wire rope's minimum breaking strength.

5.8 Anchor Points

Anchor points are a vital part of a fall arrest system. Anchor points should always be selected at the highest point possible. Always consider swing fall hazard when selecting your anchor point.

Workers must always ensure their fall arrest system, or a travel restraint system is safely secured to an anchor that is not damaged and meets the following requirements:

- Permanent anchor points must have an ultimate load capacity of 16 kN (3600 lbs) per worker attached. If the structure to which the anchor point is attached is not capable of withstanding 16 kN, an anchor point capable of withstanding 2 times the maximum arresting force (in any direction in which the load may be applied) for fall arrest may be used.
- Temporary anchor points must:
 - Have a minimum breaking strength in any direction in which the load may be applied of at least (3600 lbs) or two times the maximum arresting force per worker attached when used in a fall arrest system.
 - Have a minimum breaking strength in any direction in which the load may be applied of at least 3.5 kN (800 lbs) per worker attached, when used in a travel restraint system.
 - Be installed, used, and removed according to the manufacturer's specifications or specifications certified by a professional engineer, and
 - Be removed from use on the date on which the work project for which it is intended is completed, or the time specified by the manufacturer or professional engineer.



- An anchor point to which a personal fall arrest system is attached may not be part of an anchor used to support or suspend a platform.

NOTE: Certified anchors have an expiry at the University. For roof anchors please contact the TIMs Architectural group for recertification. For any and all other anchors on the University please contact your supervisor for recertification. If a temporary anchor is required, please contact your supervisor for assistance.

6. FALL PROTECTION SYSTEMS

6.1 Control Zones

Control zones are to be constructed no less than 2 meters (6.5 ft.) from the edge of the roof/leading edge on all sides and should be constructed of material such as rope, wire, or chain so that it is easily identifiable and prohibits personnel from entering the control zone. All personnel working inside a control zone shall be protected by a travel restraint system to prevent the worker from reaching the unguarded edge. If a worker will, at all times, remain further from the unguarded edge than the width of the control zone, no other fall protection system is required. Workers are not required to use a fall protection system when crossing the control zone to enter or leave the work area. When crossing a control zone to enter or leave a work area, the worker must follow the most direct route. Refer to *AB OHS Code Part 9 Fall Protection Section 161(1) Control Zones* for further information on proper setup.

If a control zone is used, management must ensure that it is only used if a worker can fall from a surface that has a slope of no more than 4 degrees toward an unguarded edge or that slopes inwardly away from an unguarded edge and is not less than 2 metres (6.5 ft.) wide when measured from the unguarded edge. A control zone may not be used to protect workers from falling from a skeletal structure that is a work area.

6.2 Guardrails

Guardrail systems are an integral part of many travel restraint systems and whenever used, must comply with the *AB OHS Code Part 22 – Safeguards for the construction, use, care, and maintenance of guardrails* at all times. To meet the requirements of this Code, guardrails must:

- have a horizontal top member installed between 36" (92cm) to 42" (107cm) above the base of the guardrail,
- have a horizontal, intermediate member spaced mid-way between the top member and the base,
- have vertical members at both ends of the horizontal members with intermediate vertical supports that are not more than 3 metres apart at their centers, and
- is constructed of lumber that is 1.5" (3.8cm) by 3.5" (8.9cm) or of material with properties the same as or better than those of lumber.



- A temporary guardrail does not require a horizontal intermediate member if it has a substantial barrier positioned within the space bounded by the horizontal top member, toe board and vertical members that prevents a worker from falling through the space.
- A guardrail must be secured so that it cannot move in any direction if it is struck or if any point on it comes into contact with a worker, materials, or equipment.

NOTE: If the use of a guardrail is not reasonably practicable, management must ensure that a travel restraint system is used.

6.3 Hole Covers

Hole covers must meet the requirements specified within the *AB OHS Code Part 22 - Safeguards*. All open holes through which a worker could fall must be protected by:

- a securely attached cover designed to support an anticipated load, or
- guardrails and toe boards.

If a hole cover, guardrail or toe board, or any part thereof, protecting an opening or hole is removed for any reason, a temporary cover or other means of protection must be used to replace it immediately. If a temporary cover is used to protect an opening or hole, a warning sign or marking clearly indicating the nature of the hazard:

- is posted near or fixed on the cover, and
- is not removed unless another effective means of protection is immediately provided.

6.4 Travel Restraint Systems

Travel Restraint is a personal fall protection system or similar barrier that prevents a worker from traveling to an edge or work position from which the worker could fall. Travel restraint systems include the use of a full body harness, a positioning lanyard (non-shock absorbing lanyard) or SRL. Another common travel restraint system used is a rope and rope grab system which is installed so that the worker cannot come close enough to the leading edge to fall.

When you cannot use a guardrail or opening cover to protect against a fall, then the next option is to use a travel restraint system. A travel restraint system restricts the worker's movements in the fall hazard area by allowing them to reach the edge but not allowing them the space to fall over the edge. Travel restraint is used for leading edge work where there is an unprotected end of formwork, floors, roofs, decks, or other walking or working surfaces.

A Fall Protection Plan is required if a travel restraint system is used so that workers know which equipment and anchors to use. However, rescue procedures are not necessary since a worker will not fall and be left suspended in the air.



NOTE: If a travel-restraint system does not prevent a worker from reaching the edge, a fall-arrest system must be used.

NOTE: Certified anchors have an expiry at the University, please contact your supervisor for recertification.

6.5 Fall Arrest Systems

Fall Arrest Systems are personal fall protection systems that allow a worker to fall but will arrest the fall in progress before the worker contacts the ground or any obstruction below. All fall arrest systems must include the use of a full body harness and a shock absorbing lanyard or a self retracting lifeline. In the event a SRL is used, management must ensure that the worker's free fall distance is limited to 1.2 metres (4 ft.).

A Fall Protection Plan is required for the use of all fall arrest systems to ensure workers know the clearance distance and which equipment and anchors are required. The vertical distance a worker may fall must be limited by selecting the shortest length lanyard that will still permit unimpeded performance of the worker's duties, and by securing the lanyard to an anchor that is no lower than the worker's shoulder height.

NOTE: If the use of a personal fall arrest system is not reasonably practicable, the supervisor must ensure a worker uses an equally effective fall protection system. Management needs to be made aware of the fall protection system used in replace of the personal fall arrest system.

6.6 Horizontal Lifeline

A horizontal lifeline is a rope made of synthetic fibre or wire, a rail or other similar systems that are attached horizontally to two or more anchors, and to which a fall arresting system or travel restraint system may be attached. Before a horizontal lifeline system is used, one of the following personnel must certify that the system has been installed according to the manufacturer's specifications or the specifications certified by a professional engineer:

- a professional engineer,
- a competent person authorized by the professional engineer,
- the manufacturer, or
- a competent person authorized by the manufacturer.

A flexible horizontal lifeline system must meet the requirements of the most current edition of *CSA Standard Z259.13-04, Flexible Horizontal Lifeline Systems for use, care, inspection, maintenance, and storage* at all times.



NOTE: In the event workers are required to use a temporary lifeline, contact HSE, when required, to assist in a site assessment and the development of a Fall Protection Plan.

6.8 Procedure Based Fall Protection Systems

A procedure-based fall protection system involves the use of administrative controls or work procedures to assist in minimizing the risk of a fall. It is the last choice for fall protection. Refer to *Part 9 Section 159 (1) in the Occupational Health and Safety Code* to ensure a procedure-based fall protection system is appropriate for the given task. Procedure based fall protection may only be used for the following:

- Installation or removal of fall protection equipment.
- Emergency repairs.
- At-height transfers between equipment and structures, if allowed by the manufacturer's specifications.
- Situations in which a worker must work on top of a vehicle or load.
- In order to utilize a procedure-based fall protection system the following eight conditions must be met.
- a hazard assessment in accordance with the requirements of *Part 2 – Hazard Assessment and Control in the AB OHS Code* is completed before work at height begins,
- the procedures to be followed while performing the work must be in writing and available to workers before the work begins,
- the work is carried out in such a way that minimizes the number of workers exposed to a fall hazard while work is performed,
- the work is limited to light duty tasks of limited duration,
- the worker performing the work is competent to do it,
- when used for inspection, investigation or assessment activities, these activities take place prior to the actual start of work or after work has been completed, and
- the procedures do not expose a worker to additional hazards.

7. SPECIAL FALL PROTECTION SITUATIONS

7.1 Elevated Work Platforms / Aerial Devices / Scissor Lifts

Part 9 Fall Protection, Section 156(1) in the AB OHS Code requires all workers to use a personal travel restraint system when working from a boom-supported work platform, boom supported aerial device, or telescopic forklift truck work platform (i.e.: telehandler). The lanyard used is to be short enough to prevent the worker from being ejected, yet long enough to allow the worker to perform work.

Work platforms come in square and rectangular shapes. Because of the physical shape of the work platform, the location of the anchor points, and the need for workers to be able to move about the entire platform, it may be impossible to both limit the length of a regular lanyard and still allow a worker to



perform work unimpeded. Self-Retracting Lifelines (SRLs) allow for the easiest mobility throughout the platform and provide constant travel restraint, not allowing a worker to fall over the guardrails of the platform.

The travel restraint system must be connected to the equipment's manufactured anchor point. If the work platform manufacturer did not provide an anchor point, then anchor points certified by a professional engineer to the requirements of the most current edition of *CSA Standard Z259.16-04, Design of Active Fall-Protection Systems* must be used.

NOTE: When using scissor lifts workers are required to use Fall Protection PPE and secure themselves to the anchor point in the basket.

7.2 Fall Protection on Vehicles and Loads

If a worker may have to climb onto a vehicle or its load at any location where it is not reasonably practicable to provide a fall protection system for the worker, management must take steps to eliminate or reduce the need for the worker to climb onto the vehicle or its load and ensure that a procedure in place of fall protection equipment is developed (please refer to Procedures in Place of Fall Protection Equipment above). However, if load is not secured against movement, workers are not permitted to climb onto the load.

7.3 Ladders / Scaffolding

When workers are required to use ladders (portable or fixed) they are required to review the [Ladder Safety Guidelines](#) and complete ladder safety training. Prior to working with or on scaffolding workers are required to review the [Scaffolding Guidelines](#).

8. REQUIRED DOCUMENTATION

8.1 Field Level Hazard Assessment (FLHA)

The FLHA must be completed before the work begins and must assess fall protection requirements when workers are assigned to work at heights or other areas that present fall hazards.

NOTE: If a hazard can not be controlled to an acceptable level, the worker and supervisor will evaluate and try to control the hazard and if additional assistance is required please contact HSE.

8.2 Fall Protection Plans

Section 140 of AB OHS Code requires employers to prepare a fall protection plan when work-at-height situations meet both of the following criteria:

- A worker may fall 3 metres (10 ft.) or more.



- The worker is not protected by guardrails.

The purpose of the fall protection plan is to:

- Ensure employers and workers do enough planning before beginning work at height to assess (and then eliminate or control) fall hazards for workers. This includes choosing the most appropriate fall protection system and equipment for the specific work site conditions.
- Show that the employer determined the clearance distance below the work area to ensure that if a worker falls, they do not strike the ground, an object, or level below the work area. Inadequate clearance can result in serious injury or loss of life. If there is inadequate clearance, a different type of fall protection system may be required, or the work must be done differently.
- Ensure workers using the fall protection system have access to all the most up-to-date information they need to assemble, maintain, inspect, use, and disassemble it.
- Ensure that practical rescue procedures have been prepared and are understood by workers.

Fall Protection Plans must be updated when conditions affecting fall protection changes. The plans must be posted at the worksite showing workers' signatures. Please refer to the *Fall Protection Plan*.

NOTE: If a Fall Protection Plan is required for a potential fall arrest emergency, the supervisor will be responsible to coordinate the development of a rescue plan through an HSE approved external agency. If additional assistance is needed please contact HSE.

Fall Protection Plan Contents

The fall protection plan must include the following information:

- **The fall hazards at the work site:** Workers and the employer must conduct a site-specific hazard assessment and list the locations and circumstances at the work site where a worker could fall (such as a leading edge, an unguarded opening, or a boom-supported work platform).
- **The fall protection system to be used at the work site:** This should be a brief description of the system being used, such as fall arrest, travel restraint, horizontal lifeline, safety net, anchor points, work positioning, or control zone. Note that a single work site might have different fall hazards that require different controls. These need to be separately identified.
- **The anchors to be used during the work:** Describe the permanent and temporary (if used) anchors, their locations, any special requirements such as the materials and structures into which they can be installed, performance and load limits, and any other pertinent information.
- **Confirmation of sufficient clearance distances:** The plan must confirm that clearance distances below the work area, if applicable, are sufficient to prevent a worker from striking the ground, an object, or a level below the work area. A work site may have several work areas with different clearance distances, depending on the design of the work site and type of fall protection systems being used. If so, the plan must confirm the safety of the clearance distances for each work area.



- **The procedures used to assemble, maintain, inspect, use, and disassemble the fall protection system, where applicable:** These procedures are often found in manufacturer's specification for the equipment and other product instructions. Procedures must provide practical and understandable instruction to workers on how to properly assemble, maintain, inspect, use, and disassemble the fall protection system. If these procedures are too lengthy to include in the fall protection plan, the plan can simply make reference to these as separate documents, provided that the documents are available at the work site and are reviewed by workers before beginning work where there is a fall hazard.
- **The rescue procedures to be used in the event of a fall:** If a worker falls and is suspended by a personal fall arrest system or safety net and needs to be rescued, rescue procedures must already be in place.
- **Worker acknowledgement (name and signature):** All workers affected by the Fall Protection Plan must review and sign off acknowledging their understanding.

Clearance Formulas

The clearance distance is the minimum vertical distance needed between the worker's feet and a lower level (this can be the ground level, but also a lower working platform for example) to prevent the worker from hitting the lower level in the event of a fall. The calculated clearance distance of a specific fall protection system may never be equal to or greater than the available clearance between the worker level and a lower platform. Clearance distances must be calculated and documented on the Fall Protection Plan.

The following formulas are used to calculate the clearance distances, based on the use of a shock-absorbing lanyard, or a self-retracting lifeline.

Determine and verify the **Total Fall Clearance Distance**. This is the minimum vertical distance between the worker and the lower level that is necessary to ensure the worker does not contact a lower level during a fall. Most manufacturers of rated personal fall protection equipment provide online calculators/tools for this purpose. Alternatively, Total Fall Clearance Distance can be calculated by the calculation of the following:



1. **Free Fall Distance:** This is the distance the worker falls before the system begins to arrest/slow the fall. Always account for the lanyard length, location of anchorage relative to D-Ring (anchorage overhead, level with or below D-ring) and potential for swing.

When using shock absorbing lanyards, the **Free Fall Distance** must be calculated as follows:

Lanyard Length: The length of lanyard and connecting hardware (anchor straps, etc.)

+ **Height of D-Ring:** The height of the D-Ring from the worker's feet (ex: 5 ft.)

— **Distance to Edge:** The distance between the anchor point and the unguarded edge.

— **Free Fall Distance using shock absorbing lanyard.**

Note: When using self-retracting lifelines, the **typical Free Fall Distance is 2 feet.**

2. **Total Fall Clearance Distance:** Once the Free Fall Distance is known, the Total Fall Distance must be calculated:

Free Fall Distance. 2ft. for SRL or as calculated above for shock absorbing lanyard.

+ **Harness Stretch.** This is the distance a properly sized and worn harness stretches in the event of a fall. 1-foot is generally used for potential harness stretch.

+ **Deceleration Distance.** This is the elongation of the arresting device when deployed after the Freefall Distance. Most devices have a Deceleration Distance of 3.5 feet.

+ **Height of Worker.** The height of the worker, or the height of the tallest worker, if more than 1 worker is performing the work at heights.

+ **Safety Factor.** This is added to ensure a buffer is provided from the lower-level obstruction after a fall. A 2-foot safety factor is a minimum.

— **Total Fall Clearance Distance**

3. **Verification.** Measure the distance to the obstruction/surface below and verify the Total Fall Distance is less than the distance to the obstruction/surface.



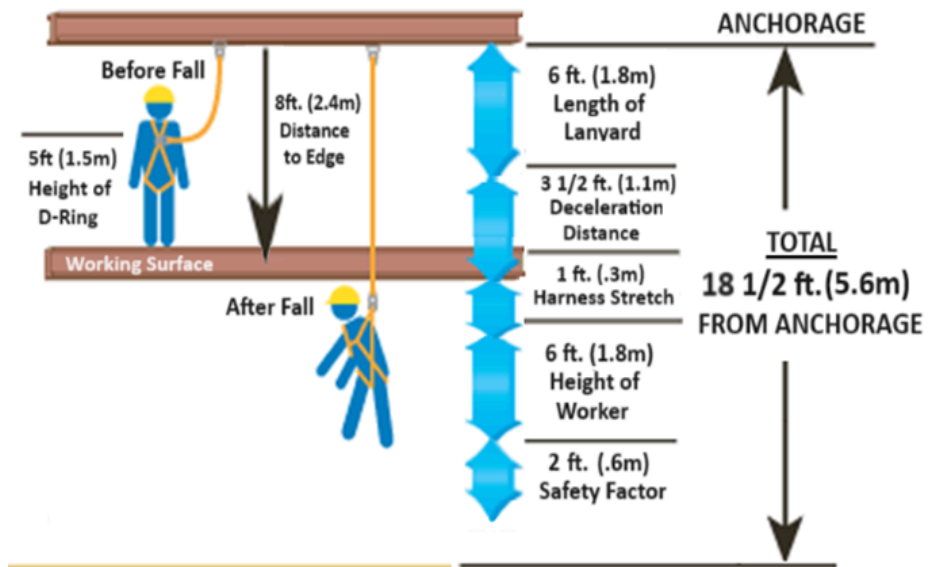
Fall Diagrams with Example Calculations:

Example #1: Calculating Fall Clearance Distance Using a Shock-Absorbing Lanyard:

FFD = 6ft. Lanyard Length
 + 5ft. Height of D-Ring
 - 9ft. Distance to Edge
 = 3ft. FFD

TFD = 3ft. FFD
 + 1ft. Harness Stretch
 + 3.5ft. Deceleration
 + 6ft. Height of Worker
 + 2ft. Safety Factor
 = 14.5ft. TFD

Verify = 18.5ft. Distance to Surface
 - 14.5ft. TFD
 = 4ft.+ Safety Margin

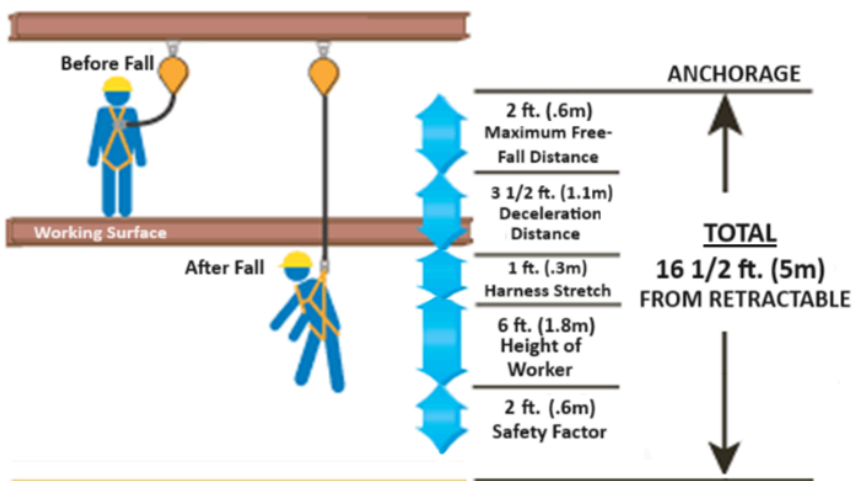


Example #2: Calculating Fall Clearance Distance Using a Self Retracting Lifeline (SRL):

FFD = 2 ft. SRL Free-Fall Distance

TFD = 2ft. FFD
 + 1ft. Harness Stretch
 + 3.5ft. Deceleration
 + 6ft. Height of Worker
 + 2ft. Safety Factor
 = 14.5

Verify = 16.5ft. Distance to Surface
 - 14.5ft. TFD
 = 2ft.+ Safety Margin



When using a retractable lanyard, the total fall distance is calculated from the point where the retractable attaches to the back D-Ring of the worker's harness.



9. SUSPENSION TRAUMA

In the event a worker falls while working at heights, they may be suspended in the air for several minutes. During this time blood can pool in the legs, depriving the brain of oxygen, and can cause fainting and orthostatic intolerance, or suspension trauma. If a worker is not rescued promptly and with correct procedures, suspension trauma can have lasting effects and even cause death.

Suspension trauma can be affected by the weather conditions, the shock and injuries sustained during a fall, blood loss, and a workers' overall health. Symptoms of suspension trauma include but are not limited to faintness, nausea, dizziness, sweating, paleness, and a narrowing of vision.

If suspended for a duration of time without movement in the legs, blood will continue to pool. Inactive leg muscles will use up the oxygen in the pooled blood and begin to burn fats to stay alive. If a worker is suddenly put into a horizontal position, such as during a rescue, this deoxygenated blood can flow back into the body (reflow syndrome) and cause damage to their organs, brain, and even cause the heart to stop.

In the event of a fall, it is extremely important for the worker to try to adopt a sitting position or move the body into a horizontal position as much as possible. With the body in a sitting or horizontal position, the blood flow is restored. If this is not possible, the worker should or push their legs off from a hard surface to keep muscles active. **Get a rescued worker immediate medical attention and ensure that medical personnel are aware of the possibility of suspension trauma.**

NOTE: Suspension trauma can be fatal within 30 minutes of the initial fall. A rescue plan must be in place prior to the work commencing. Contact HSE for assistance when required.

10. RESCUE

It is crucial to have a plan in place to rescue suspended workers quickly to prevent suspension trauma and reflow syndrome and to get them immediate medical attention. Rescue procedures specific to the task location and fall arrest system used must be identified on *the Fall Protection Plan*.

While calling 911 may be part of a rescue response, Alberta Occupational Health and Safety expects an employer to have some means of basic rescue capability at the work site. If a Fall Protection Plan is required for a potential fall arrest emergency, the supervisor must coordinate the development of a rescue plan through an approved external agency, if assistance is required contact HSE.

Basic means of rescue may include:

- having access to a man lift or scissor lift at the work site that is capable of reaching a suspended worker. Someone must be able to competently operate the equipment.
- having ladders on site that are capable of reaching a suspended worker.



- equipping workers with leg loop extensions for their full body harnesses i.e. suspension relief straps. These attach to the full body harness, providing foot loops into which a suspended worker can place his or her feet and then raise the legs. Doing so allows blood pooling in the legs to circulate. Using the foot loops may help the worker to remain comfortable until he or she returns to safe ground.
- from above the fallen worker's suspended position, having a worker lower a loop of rope into which the worker can place his or her feet and then stand up. The goal is to make the worker more comfortable by relieving the pressure of the harness straps on the legs and offering the legs something to push against to pump pooled blood back into circulation. Using the loop may help the worker to remain comfortable until he or she returns to safe ground. It may also allow the worker to connect to a descent system followed by disconnection from the fall arrest system.
- using Type 3 self retracting devices that include an integral hand winch that allows the suspended worker to be raised upwards or lowered to safe ground. Use of this device does not require the suspended worker to be conscious; and
- equipping workers in certain situations with self rescue devices such as specialized descenders that allow the suspended worker to remove themselves from their lanyard and descend to safe ground using one of these devices.
- rescue from a third-party Emergency Rescue Agency.

If a worker can be rescued by other workers or perform an assisted rescue with a ladder or manlift, the equipment must be at the site inspected and ready to be placed into service immediately. This includes having a competent and trained operator for a mobile work platform.

After rescuing a suspended worker, do not lay them flat into a horizontal position. Keep them sitting up with their legs straight out in front of them. Keep the worker calm and quiet and monitor them constantly so they do not faint and fall into a horizontal position. **Get a rescued worker immediate medical attention and ensure that medical personnel are aware of the possibility of suspension trauma.**

NOTE: Workers / Supervisors of the University are not trained to perform a rescue. Please contact HSE if you may be in a fall arrest situation.

11. INSPECTION AND MAINTENANCE

Equipment used as part of a fall protection system shall be inspected by the worker prior to use and documented on the Fall Protection Plan. Formal external inspections (recertifications) shall be carried out annually through an approved external agency.

- Annual fall protection recertification will be completed by a competent assessor.



- Workers using fall protection equipment are expected to perform a documented pre-use inspection.

Fall protection equipment must be inspected in accordance with manufacturer's specifications, as well as the applicable CSA Standard, and the following guidelines:

Harnesses

- **Webbing** – Check the webbing for frays, cuts, burns, or broken stitches. Put your hands about eight inches apart on the webbing and bend it. This will make damaged areas easier to see. Go through the entire harness in this way to identify any problems with the webbing. Check all webbing for any signs of cuts, excessive fraying, piercing, pulled or broken stitching, abrasion, excessive wear, altered or missing straps, burns and heat or chemical exposure. Inspect for loose, distorted, or broken grommets. Do not cut or punch additional holes in waist strap or strength members. Do not draw on fabric with sharpies or pens. Check the belt without grommets for torn or elongated holes that could cause the buckle tongue to slip. Check to ensure that all straps function as designed and do not jam or bind together. This is especially noteworthy for older, dirty or sun exposed harnesses.
- **Stitching** – Look for pulled or ripped stitches. Bad stitches can be as bad as not wearing a harness.
- **D-Rings** – Check each D-Ring for cracks, distortion, or sharp edges. The D-Ring should move easily. Also check to see that the attachment point of the D-Ring is secure. Harnesses can come with D-Rings located on each hip; however, there may be harnesses that only have the one dorsal (back) D-Ring.
- **Buckles** – Look for any distortion or damage. Make sure each buckle operates as it should. On tongue buckles you want to make sure that the tongue and roller move freely.
- **Labels and Inspection Tag** – Ensure the label on the harness is clear and legible. Each harness is inspected and recertified annually through an approved external agency. A tag should be located on the D-Ring which states the last inspection date and will expire a year from that date. If your harness has an expired recertification tag, please report this to supervision/the HSE Representative and remove the equipment from service.

Lanyards

- **Snap Hooks** – Inspect each snap hook, for any damage, rust, distortion, or corrosion. Make sure that the snap hook gate opens and closes freely and locks securely with adequate pressure. Make sure that any hardware is not cutting into or damaging the harness/lanyard.
- **Shock Absorber** – If using fall arrest equipment rather than fall restraint, check the shock absorber to see if there is any damage and/or if it has been activated.



- **Webbing/Stitching** – Inspect lanyard webbing and stitching following the same guidelines as harness webbing/stitching.
- **Label Inspection Tag** – Ensure the label is clear and legible. A recertification tag should be located near one of the snap hooks which states the last inspection date and will expire a year from that date. If your lanyard has an expired recertification tag, please report this to supervision/the HSE Representative and remove the equipment from service.

Self-Retracting Lifelines

- **Case** – Check the casing for any cracks, loose fittings, or corrosion.
- **Snap Hook** – Look for damage, rust, distortion, or corrosion. Ensure that the snap hook operates freely and locks securely with adequate pressure.
- **Line** – Check the rope, cable, or webbing for any distortions, fraying, cuts, or any other damage. Make sure it comes all the way out, and retracts smoothly and completely, with adequate, even pressure.
- **Shock Absorber** – If a shock absorber is attached, check it for damage or activation.
- **Impact Indicator** – If an impact indicator is equipped, check to make sure it hasn't been activated.
- **Brake Check** – Pull the line with a quick sharp action to ensure brakes lock up.
- **Label** – Check that the label is intact and legible.

Wire Slings

- Inspect wire slings for broken wires, kinks, distortion, heat damage, damaged end attachments (cracked, bent or broken end fittings caused by misuse, wear, and tear), bent hooks, corrosion, and pulled/damaged eye splices.
- Inspect for doglegs. Doglegs are permanent bends caused by improper use or handling.
- Missing or illegible sling identification. If the tag is missing or illegible, the sling should be removed from service and sent to the manufacturer for current or updated certification, tagging, and testing.

Rope

- Rotate the rope lanyard and inspect from end to end for fuzzy, worn, broken, or cut fibers. Weakened areas have noticeable changes in the original rope diameter.
- Replace when the rope diameter is not uniform throughout, following a short break-in period.
- The older a rope is and the more use it gets, the more important testing and inspection become.



11.1 Removal From Service

Equipment shall be removed from service if:

- It has been identified as damaged (please refer to inspection guidelines above)
- It is found to be defective.
- It has arrested a fall.

All damaged or defective fall protection equipment must be communicated to a supervisor to be tagged “Out of Service”, Equipment removed from service is not to be returned to service unless a professional engineer or the manufacturer certifies it is safe for use.

Equipment that is determined to be permanently defective or damaged and must be destroyed by a team of two workers, and properly disposed of.

NOTE: Workers must never throw any defective or damaged fall protection equipment in the garbage or dumpster.

12. CLEANING AND STORAGE

Fall protection equipment shall be kept free from substances and conditions that could contribute to deterioration of the equipment. Basic cleaning of all fall protection equipment will prolong the durable life of the item and will contribute toward the performance of its vital safety function. Remove all surface dirt by the following procedure:

1. Wipe off all surface dirt with a sponge dampened in plain water. Rinse the sponge and squeeze it dry. Dip the sponge in a mild solution of water and commercial soap or detergent. Work up a thick lather with a strong back and forth motion.
2. Rinse the webbing in clean water.
3. Wipe the belt dry with a clean cloth. Hang freely to dry.
4. Dry the belt and other equipment away from direct heat, and out of long periods of sunlight.
5. Store in a clean, dry area, free of fumes, sunlight, corrosive materials, sharp edges, or vibration and in such a way that it does not warp or distort the belt.

Proper storage after use is as important as cleaning the equipment of dirt, corrosives, or contaminants. Storage areas should be clean, dry, and free of exposure to fumes or corrosive elements. Ensure fall protection equipment is stored hanging up to prevent kinks in the fibers of the equipment.



13. DEFINITIONS

Anchor Point	A structure, or part of a structure, that is capable of safely withstanding any potential forces applied by a fall protection system.
Carabiner	A connector with a metal loop with an auto-locking spring gate. The loop part opposite the gate is referred to as the spine. It can quickly and reversibly connect components in a fall protection system. All snap hooks must be CSA, ANSI or CE approved.
Control Zones	The area within 2 metres (6.5 ft.) of an unguarded edge of a level, elevated work surface that has a slope of no more than 4 degrees. The control zone's warning barricade warns workers of their safe working distance from the edge of the roof.
Clearance	The safe distance required to prevent a worker from striking the next level or any other obstruction below in the event of a fall.
Connectors	All those devices situated between the worker's full body harness and the anchor point, i.e. lanyards, snap hooks, carabiners, lifelines, etc.
Free Fall Distance	The vertical distance from the point a worker falls to the point where the fall arrest system begins to cause deceleration of the fall. It is always important to limit free fall distance in any fall arrest system.
Guardrail System	A barrier erected to prevent workers from falling to lower levels.
Lifeline	A component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline) or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline) and that serves as a means for connecting other components of a personal fall protection system to the anchorage. Vertical lifelines must have a minimum breaking strength of 6,000 lbs (27kN).
Maximum Arresting Force	The peak dynamic force exerted on a body while a fall is being arrested.
Opening	A gap or void of 30" (76cm) or higher and 18" (46cm) or wider in a wall or partition through which a worker can fall to a lower level.



Rope Grab (Fall Arresters)	A deceleration device that travels on a lifeline and automatically (by friction) engages the lifeline and locks to arrest the fall of a worker. A rope grab usually employs the principle of inertial locking cam, level blocking or both.
Safety Net	A safety net is a net to protect people from injury after falling from heights by limiting the distance they fall and deflecting to dissipate the impact energy. These are normally installed on high rise construction projects.
Self-Retracting Lifeline (SRLs)	Performs a tethering function while allowing vertical movement (below the device) to the maximum working length of the device, which will arrest a worker's fall.
Shock (Energy) Absorber	As part of a lanyard, or as a separate unit, shock absorbers are referred to as energy absorbers and serve to reduce the arrest forces which occurs during a fall on both the anchor point and the worker. They use a variety of mechanisms, such as tearing, stretching, or ripping actions to lengthen the deceleration distance and absorb the fall energy. Consequently, additional clearance is required when using a shock absorber in any system.
Snap Hook	A connector comprised of a hook-shaped member with a closed keeper or similar arrangement that may be opened to permit the hook to receive an object and when released will automatically close to retain the object. The locking type with a self-closing keeper that remains closed and locked until it is manually opened, is the only authorized snap hook. Non-locking snap hooks are expressly forbidden for fall prevention and protection purposes. All snap hooks must be CSA, ANSI or CE approved.
Toe Board	A low protective barrier (minimum of 5.5" (14cm) in vertical height from the top edge to the walking or working surface and no more than ¼" (6.35mm) clearance above the walking or working surface, that will prevent the fall of materials and equipment to lower levels and provide protection from falls of personnel.
Unprotected Sides and Edges	Any side or edge of a walking or working surface at least 3 ft. to 3.5 ft. high (i.e.: floor, ramp, or runway where there is no wall or guardrail system).
Walking or Working Surface	Any surface, regardless of vertical or horizontal, on which a worker walks or works including but not limited to floors, roofs, ramps, bridges, runways, form work and concrete reinforcing steel but not including ladders, vehicles, or trailer on which workers must be located to perform their duties.