

Fall Protection Guidelines

Purpose and Scope

The purpose is to establish safety procedures applied to all facilities under the jurisdiction of Florida International University and any activity or operation involving work on an unprotected elevated surface greater than 4 feet above the surrounding ground or floor level.

Applicable standards and references include:

- OSHA General Industry Standards, 29 CFR 1910 Subpart D – Walking-Working Surfaces.
- OSHA General Industry Standards, 29 CFR 1910.140 – Personal Fall Protection Systems.

Responsibilities and Accountability

Only authorized personnel who have received Fall Protection Training will have access to areas that require elevated work and represent fall risks.

Authorized/Qualified Personnel

- Understand Fall Protection Program and Fall Arrest System requirements.
- Complete all the required training and comply with procedures.
- Request clarification from Environmental Health and Safety in case fall protection requirements or methods are not fully understood before initiating work activity.
- Understand the use, maintenance and inspection of fall protection equipment prior to use.
- Recognize and only use approved anchor points.
- Immediately discontinue work if additional hazards develop or conditions change.

Environmental Health & Safety (EH&S)

- Implement the site fall protection program and promote engineering controls, where feasible.
- Schedule and provide personnel training.
- Verify that fall protection procedures are implemented for elevated work.
- Provide technical support and guidance on the application of control measures.

Facilities Management

- Determine if there are alternate methods to eliminate the work or reduce the risk of work on an elevated work surface by evaluating the hierarchy of controls in the specific order presented.
- Allocate time for the authorized employee to receive training recommended by EH&S.
- Communicate fall protection methods prior to the commencement of work to authorized personnel.
- Design and/or verify installation of fixed and engineered fall protection controls for all new, modified and renovated facilities.
- Ensure that the design of new facilities, processes or systems supports elimination of routine elevated work activities and minimizes non routine elevated work activities.
- Elimination through relocation of elevated equipment/systems requiring access.
- Complete the Jobs Hazard Analysis (JHA) before accessing a new elevated surface.
- Reschedule the work for a time when the hazard does not exist.
- Installation of fixed fall protection systems.
- Isolation or separation of personnel from the fall hazard.
- Use active fall protection systems – fall restraint or personal fall arrest system (PFAS)
- Administrative controls – work practices or procedures.
- When work on an unprotected elevated work surface cannot be avoided, follow all requirements of this

procedure.

Routine and Non-Routine Elevated Work

Routine Elevated Work

Work areas where authorized personnel access complete repair, inspection, and maintenance activities more than six (6) times a year and represent a fall hazard greater than 4 feet/1.2 meters.

Routine-elevated work areas must be protected as follows:

1. Evaluate if the elevated work is necessary.
2. Install a permanent engineered fall protection system and establish required procedures for protecting elevated work surfaces requiring routine access, including:
 - Guardrail Systems.
 - Fixed Ladders with fall arrest systems.
 - Floor Openings.
 - Pre-engineered System (PFAS), with engineered anchor points, protectors etc., when use is managed by procedure and training.

Non-Routine Elevated Work

Work areas where authorized personnel have access to complete maintenance, inspection, and repairs activities that would not be considered routine or less than (6) six times per year.

Non-routine elevated work activities must be protected, and the controls must be designed by a competent person as follows:

1. Evaluate if the elevated work is necessary. Replace or engineer out the need for elevated work if feasible.
2. Assess the potential fall hazards and establish controls, such as:
 - a. Personal Fall Arrest System.
 - b. Positioning System.
 - c. Restraint System.
 - d. Suspension System.
 - e. Portable Ladders.
 - f. Articulating Aerial Lifts.
 - g. Scissor Lifts.
 - h. Powered Industrial Truck – Mounted Elevated Work Platforms.
 - i. Elevated Work Surfaces with Unprotected Edges, Fragile Areas or Skylights.
 - j. Scaffolds.
3. Develop a fall protection plan.
4. Develop an Emergency Rescue Plan.

Hierarchy of Controls

The method of control depends on the nature of work conducted at the area, suitability of the control, and its feasibility to provide adequate protection. At FIU the following hierarchies of controls are to be considered to eliminate or control fall hazards:

1. **Elimination:** For routine operations and maintenance, fall hazards are eliminated by installation of handrails or relocation of equipment if feasible.

2. **Passive Fall Protection:** Isolating or separating personnel from the fall hazard.
3. **Active Fall Protection:** Used as an alternative when a passive fall protection system solution is not sufficient to protect the authorized personnel when performing an elevated work. These systems are dynamic and require the use of special gearing. There are two types of Active Fall Protection Systems:
 - **Fall Restraint:** Securing to an anchor point using a lanyard designed to prevent personnel from reaching an unguarded edge.
 - **Personal Fall Arrest System (PFAS):** Protective equipment required in the absence of permanent engineered fall protection system.

Personal Fall Arrest Systems

Personal Fall Arrest Systems must comply with all local, state/provincial and national regulations and manufacturer's recommendations for inspection, use and storage.

Personal fall arrest systems (PFAS) have three key components:

- **Body Wear:** Support equipment worn by the user (Harness)
- **Connecting Device:** Device used to connect the body wear to the anchor point. (Lanyard)
- **Anchor Point:** Secure point of attachment for the connection device (Tie off point)

The PFAS system must be designed to prevent contact with the user at any level or equipment below. The swing hazard radius must also be calculated, and all potential contact areas avoided.

Body Wear (Harness)

Body wear consists of:

- Full body harness made from light and heat-resistant synthetic materials.
- Full body harnesses secure the legs, waist, chest and shoulders and are attached to a connecting device by the D-ring in the center of the back near the shoulders.
- The connecting device is connected to an anchor point.

The full-body harness is the only acceptable type of body wear due to the distribution of force in the event of a fall and the ability to suspend personnel in an upright position while awaiting assistance.

Note: The use of body belts is prohibited for all fall arrest applications. Body wear must be inspected by the user prior to each use. The manufacturer's recommendations for inspection points shall be observed. In addition, body wear should be subject to annual inspections by a competent person.

Connecting Devices (Lanyard)

- A competent person must inspect each knot in a lanyard and ensure it meets requirements before employees use it.
- Connecting devices (safety lanyards, shock-absorbing lanyards, horizontal or vertical lifelines) connect the harness to the anchor point or as a connection device to a lifeline system.
- Lanyards are short lines made of rope, strap, webbing, cable or similar materials with connectors on both ends.
- Some lanyards have shock-absorbing features to provide additional force reduction (up to 80%) in the event of a fall.
- Do not use shock absorbing lanyards to arrest a fall when working less than 10 feet off the ground.

Caution: In the event personnel need to detach and reattach a lanyard to a new anchor point, during movement either horizontally or laterally, the “Y” lanyard technique is required. Two safety lanyards are used, and the first lanyard must not be detached from the anchor point until the second lanyard is attached to the new anchor point.

Retractable Lifeline

- A self-contained device links the harness to the anchor point.
- The device is continuously taut, allowing the user to travel varying distances and directions while still attached to a fall protection device.
- As the user moves away from the device, the device lets out the lifeline and retracts as the user moves closer to the device.
- This system gives the user the ability to move in various directions within the safe working distance of the lifeline.
- If a fall occurs, a locking mechanism in the device stops the lifeline, which then acts as a fixed arrest system.

Vertical Lifelines

- Are used in conjunction with an attached fall arrest device, such as the rope grab, between the harness and the anchor point.
- A lifeline is suspended vertically from an anchor point located overhead.
- The user attaches the harness to the lifeline with a safety lanyard and the rope grab or similar fall-arresting device.
- This system gives the user the ability to move limited horizontal distances and different vertical heights when the system is adjusted.
- If a fall occurs, the fall-arresting device locks and the lifeline act as a fixed arresting system.
- Each employee must be attached to a separate lifeline.
- A competent person must inspect each vertical lifeline and ensure it meets requirements before employees use it.

Horizontal Lifelines

- Cables suspended horizontally between two fixed anchor points at a level even with or above the user.
- The user attaches the harness to the lifeline with a safety lanyard and fall arrest device.
- This system gives the user the ability to move horizontally the length of the lifeline.
- Provided the lifeline meets the proper rating, multiple users are allowed on the horizontal lifeline.
- If a fall occurs, the lifeline acts as a fixed arresting system.
- Ensure each horizontal lifeline is designed, installed, and used under the supervision of a qualified person.
- Horizontal lifeline must be part of a complete fall arrest system that maintains a safety factor of at least two.

Caution: A proper attachment to an anchor point is essential. Use of knots is not permitted, and lifelines may not be wrapped directly around a support structure. Connecting devices must be inspected by the user prior to each use. The manufacturer’s recommendations for inspection points shall be observed. In addition, connecting devices shall be subject to annual inspections by a competent person.

Anchor Points

- Anchor points are secure points of attachment for the connection device of a fall protection system. Anchor points are structural elements located above or at the elevation of the user.

- Anchor points positioned above the user are preferable due to reduced distance of free fall. The connection to the anchor point is a direct connection with a locking snap-hook with a spring-loaded keeper, cross arm strap, eye bolt or other method to properly secure the connection device.
- The anchor point must be capable of withstanding a static force of (5,000 pounds, increased by a factor of 0.2 (20%) for each additional lanyard.
- Anchorages used to attach to personal fall equipment must be independent of any anchorage used to suspend employees or platforms on which employees work.
- Anchorages must be capable of supporting at least 5,000 pounds (22.2 kN) for each employee attached.

Certified Anchor Points

- Permanently designed anchor points are identified and documentation regarding the acceptability of the anchor points is maintained in local site files.
- Anchor points have a minimum breaking strength of 5,000 pounds and are designed by a competent person.
- Anchor points are certified by a competent person prior to initial use.
- Permanently designed anchor points are visually inspected by competent person on an annual basis (or prior to use if time period between uses exceeds 1 year) for cracks, rusting or other signs of support deterioration.
- Points are free of rough or sharp edges that can damage the connector or lifeline.
- Points are positioned:
 1. At a height to maintain free fall to 6 feet or less.
 2. At a height to prevent the user from contacting the ground or equipment below, accounting for free fall distance, deceleration distance and worker height.
 3. To prevent swing into surrounding structures or equipment in the event of a fall.

Non-Certified Anchor Points

- Anchor points include strong structural elements (e.g., steel beams) capable of supporting 5,000 pounds but are not designed or intended as permanent fall protection anchor points.
- These anchor points must be confirmed by a structural engineer and reviewed by a competent person prior to being used for fall protection.
- Suitable attachment devices such as a beam clamp must be used.

Use of Personal Fall Arrest Systems

- Equipment must be inspected prior to each use.
- For positioning and fall arrest, an approved full body harness equipped with a D-ring in the center of the back near the shoulders must be used.
- Approved lanyard of appropriate length must be used for positioning and fall arrest.
- Shock absorbing lanyards must not be used for positioning purposes.
- A lanyard must be connected at all times.
- When repositioning is required, a second lanyard must be connected to the new connection point prior to disconnecting the first lanyard.
- All connecting devices must be approved for intended use and of a self-locking design.
- A fall arrest rescue plan or means for self-rescue must be in place prior to use.

Inspection and Maintenance of Personal Fall Arrest System Components

- Personal fall arrest system components (body wear and connecting devices) are inspected by the user prior to every use and replaced if found damaged or defective. Personal Fall Arrest Systems exposed to an in-service load (arresting a fall) must be immediately removed from service and destroyed to prevent the system from being used again.

- Personal fall arrest system components must be stored in a clean area protected from exposure to sunlight, surface contamination or mechanical damage and in full compliance with manufacturer's recommendations.
- Fall arrest system components must be allowed to dry if they become wet while in use. Wet harnesses and lanyards shall not be stored until they have been thoroughly dried.
- Periodic inspections of connecting devices must be performed by trained inspectors as frequently as required by applicable regulations and manufacturer's recommendations, but no less than annually.

Inspection Criteria of Personal Fall Arrest System Components

- Personal fall protection systems must be inspected before initial use, during each work shift mildew, wear, damage, and other deterioration. Defective components must be removed from service.
- Body wear (harnesses) must be inspected for cuts, burns, chemical damage, abrasions, stretching, frayed fibers or edges, pulled stitches or other signs of wear.
- Buckles, D-rings, and grommets (harness hardware) must be inspected for proper function, elongation, distortion, loose components, rust, cracks, free movement or other signs of wear.
- Safety lanyards must be inspected for cuts, burns, chemical damage, abrasions, stretching, frayed fibers or edges, pulled stitches or other signs of wear.
- Safety lanyard hardware must be inspected for proper function, elongation, distortion, loose components, rust, cracks, free movement or other signs of wear or malfunctioning. Spring-loaded locking snap-hooks and carabiners must be inspected for proper functioning, seating and closure.
- Shock absorber (lanyard) must be inspected for any signs of wear affecting the functioning of the shock absorber. The shock absorber must be checked for signs of elongation or deployment of the warning flag.
- Ropes and cables must be inspected for signs of cuts, burns, chemical damage, abrasions, stretching, frayed fibers or edges, rust, pulled stitches or other signs of wear.
- Retractable lifelines and winches must be inspected for proper functioning.
- All fall protection equipment found to be defective must be removed from service and immediately replaced.

Guardrail Systems

All routinely accessed elevated work platforms must have a guardrail system around the entire periphery exposing personnel to a fall of four (4) feet or greater. The design of a permanent guardrail system must be in accordance with standard handrail specifications.

- Guard railing systems must include a top rail around the upper periphery. The height of the top rail above the platform must be 42 inches +/- 3 inches. The guardrail must include a mid-rail approximately midway between the top rail and the platform surface. Each top rail, mid rail or equivalent vertical barrier must withstand a concentrated test load of 200 pounds applied at any point in all directions. In addition, the guard rail system must have a toe plate 4 inches off the walking surface. Toe plates (boards) may be omitted at access openings.
- Any break or opening in the guardrail system (i.e., fixed ladder access point) must be protected with a self-closing ladder gate.
- Flexible materials such as cables, chains, and ropes may not be used in the railing system, except as a mid-rail at access openings 30 inches wide, or less.
- Temporary systems must be constructed of suitable materials, including wood, pipe, cable, etc. **Non-metallic rope is prohibited.** Wire rope is only allowed for construction applications.

General Requirements for Guard Railing Use

- Personnel must not climb on or lean over the guardrail systems.
- Guardrail systems may not be used as anchor or tie off points.
- Any break or opening in the guardrail system (i.e., fixed ladder access point) must be protected with a self-closing gate.

- Where falling objects present a hazard to people below, additional screening between the mid rail and toe board may be required.

Portable Ladders

- Portable ladders include step ladders and extension ladders.
The primary purpose of portable ladders is for access to remote work areas where permanent access is not provided or feasible.
- Ladders are not intended to be used as a work platform, unless specifically designed and include a work platform.
- Ladder use is intended for non-routine access or inspection tasks or other tasks where three points of contact can be maintained or only broken for short durations.
- Personnel must not use as steps, the top step of a stepladder or cap (if equipped).
- Ensure the waistline is positioned above the top step when using a stepladder. If knees are above top of stepladder or the employee cannot maintain a handhold on the ladder, this means you have climbed too high.
- If previous conditions cannot be met, a Job Hazard Analysis (JHA) should be conducted to determine the most appropriate type of fall protection (e.g., work platform, rolling staircase with standard railing, etc.)
- EH&S remains available to assist with the JHA.

General Portable Ladder Use Rules

- Portable ladders are used in accordance with manufacturer's specifications.
- Users observed the "4-to-1" use rule to determine the proper ladder angle. For every 4 feet the ladder extends vertically from the ground to the support point, the ladder base must be 1 foot out horizontally from directly below the support point.
- Straight ladders over 6 feet are secured to a structural member to prevent the movement of the ladder. If the ladder cannot be secured, then additional personnel must be assigned to ensure that the base of the ladder remains secure.
- Stepladders are permitted up to 10 feet in height.
- Movable platform ladders (4 leg design with wheels) are permitted to 20 feet and have side railings provided over 4 feet.
- Personnel working above 4 feet must maintain 3 points of contact or implement additional fall protection measures.
- Portable straight ladders are restricted to 25 feet in working height.
- Portable ladders, including step ladders, must be of non-conductive design.
- All ladders must be inspected prior to use for the following:
 - Missing or loose steps or rungs.
 - Damaged or worn non-slip feet.
 - Loose nails, screws, bolts or nuts.
 - Loose or faulty spreaders, locks or other metal parts in poor repair.
 - Cracked, split, worn or broken rails, braces, steps or rungs.
 - Sharp edges on rails and rungs.
 - Rough or splintered surfaces.
 - Corrosion, oxidation and excessive wear, especially on treads.
 - Rot, decay, or warped rails in wooden ladders.
 - Cracks and exposed fiberglass.
 - Distortion of the rails.
 - Missing identification labels.
- Use visual signs and or a buddy system where a ladder is placed in an obstructed path of personnel, such as, corners, close to opening doors and others.
- A buddy system can be used as a risk mitigation against blind spots, serve as attendant and others.

- Follow the “Buckle Rule” also known as the “Belly Button Rule”, keep your belt buckle (or belly button) always positioned between the side rails of the ladder. If the job requires you to violate this rule, you need to reposition the ladder or a different one.

Fixed Ladders

- Fixed ladders 20 feet in height or more are required to be equipped with a cage around the ladder starting 7 feet from the bottom. The top section of the cage extends 3 feet over the edge of the landing platform. If the fixed ladder is greater than 30 feet in length, a resting platform is required every 30 feet.
- Personal fall arrest systems are provided for fixed ladders greater than 20 feet and may be recommended on a case-by-case basis for ladders less than 20 feet.
- Personnel working from fixed ladders must use fall protection if three (3) points of contact cannot be maintained. Fall protection must be attached to a suitable anchor point.
- Inspect fixed ladders before use and at least annually by competent person.

Note: Fixed ladders with an excess of 20 feet in elevation require additional fall protection provisions.

Caution: Three (3) points of contact (at least two hands and one foot, or one hand and two feet) must be maintained when ascending and descending from any ladder. This technique provides a secure position on the ladder that allows for recovery from minor slips or loss of balance.

Scissor Lifts

Scissor Lifts are fully enclosed by a top rail, mid rail, and toe board. Personnel are not required to be tied off when working from a scissor lift that has properly maintained guardrails when the platform is supported by the frame structure. If full railings are not available, personnel must be tied off by at least one connection between their body harness and an approved anchor point. **Standing or sitting on the guardrails to gain additional reach is prohibited.** If access is required beyond the handrail system provided on the lift, full fall arrest systems must be applied.

Articulating Aerial Lifts

- Use guardrail systems, including a top rail, mid rail, and toe boards as the primary engineering control for fall protection.
- Personnel operating aerial lifts must:
 - Inspect and use the equipment per manufacturer's recommendations.
 - Wear a full body harness and shock absorbent lanyard attached to an approved anchor point on the lift or platform.
 - Always stand firmly on the platform floor and do not sit or climb on the edge of the basket or use planks, ladders or other devices for a work position.
- In the event personnel are 4 feet or more above the walking-working surface and when colleagues must leave the aerial lift platform to complete work in an area without sufficient fall protection, they must be tied off at all times by at least one connection between their body harness and an approved anchor. **Sitting or standing on the guardrails to gain additional reach is prohibited.**

Scaffolds

- Use scaffolds designed and constructed by trained and qualified personnel.
- Conduct and document scaffold safety training including the following minimum content:
 - Scaffold capacity and loading.
 - Fall protection requirements while erecting, modifying, dismantling and use.
 - Use of scaffold components.

General Requirements for Scaffold Use

- Floor/ground mounted scaffolds with complete guard railing systems (top rail, mid rail and toe boards) do not require additional fall protection controls.
- Movable floor scaffolds with work platforms are not to be repositioned when any personnel are riding the scaffold in the elevated position. Casters must always be locked when in use.
- When assembling/disassembling scaffolds, fall protection is required unless deemed infeasible (and documented) by a Competent Person and is reviewed with EH&S.
- When using a suspended scaffold, the use of an individual, independent lifeline, anchorage point, and full-body harness is required for each person on the scaffold.
- Prior to climbing off a scaffold or platform to access an unprotected work area that is 6 feet (2 meters) or more above a walking-working surface, a PFAS must be used.
- Conduct daily inspections and indicate conditions on tag affixed to the scaffolding.

Floor Openings

Openings greater than 6 inches in any dimension along walking and working surfaces must be covered with a material that provides support at least twice the maximum intended weight of personnel, equipment and materials. Removable covers must be secured to prevent accidental displacement by wind, equipment, or workers and have full edges bearing on all sides. Removable covers must be painted with a distinctive color or marked with the word HOLE or COVER to provide warning of the hazard and not rise over one (1) inch off the surface and/or create a trip hazard.

Temporary fall protection systems, such as portable guardrail systems, must be provided when hole covers are not in place and secure. Unprotected skylights must have standard guard railing similar to floor opening, or be caged to withstand a minimum load of 200 lbs.

Additional Information and Guidance

To request assistance please contact EH&S by email ehs@fiu.edu or by phone (305)348-2621.