



## **Safety & Risk Management Policies and Procedures**

**Title:** Fall Protection Policy, 2013, Rev March2019, Feb 2020.

**Rationale:** Falls from heights are among the leading causes of serious injuries. To prevent unnecessary injury from various fall hazards and comply with [OSHA Subpart D – Walking-Working Surfaces](#).

### **Goals:**

- Establish a comprehensive fall protection plan, educate supervisors/employees about recognizing fall hazards and methods to prevent falls and injuries by safe design, hazard elimination, engineering controls, personal fall protective equipment and training.

### **Policy & Procedure:**

Departments (Supervisors) who assign work activities that expose an employee to a four foot or greater fall hazard (or near/above dangerous equipment or machinery) are responsible to implement this fall protection policy, provide fall protection systems and arrange for training. Department Heads and Supervisors should become familiar with this policy and provide for effective fall protection. Efforts should be made to eliminate the fall hazard by engineering or other controls or processes. Appropriate fall protection will be determined by the task to be performed and by the specific work location. In general, fall protection is required anytime an employee/student is exposed to a four foot or greater fall hazard – 1910 Subpart D – Walking-Working Surfaces - [OSHA 1910.28](#).

### **Summary Overview**

Fall hazards can be managed by a best practices approach that includes a roof (or other fall hazard area) authorized access system, arranging for employee fall hazard training and an individual site hazard analysis that identifies the most appropriate type of fall protection system. Specific fall hazards can be addressed by covers, guardrail systems, personal fall arrest systems and designated work areas.



## Types of Fall Protection Systems

- 1) Guardrail with a toe-board, mid-rail and top-rail.
- 2) Personal fall arrest system (full body harness system) (5000 lb per person anchor).
- 3) Fixed ladder vertical safety system (cable and sleeve) – typically connects to front chest D-Ring with engineered cable sleeve.
- 4) Fall restraint system – designed to prevent a fall from occurring over an unprotected open edge – secure worker to anchor with lanyard which will not allow center of gravity over edge. (1000 lb anchor)
- 5) Positioning device – limits fall to maximum of 2’ and allows for use of both hands – employee must also use full body harness as well. Typically connects to two hip D-rings.
- 6) Engineered lifelines with full body harness system.
- 7) Warning lines in “Designated Area” – note this is an administrative control technique for very low risk areas and will not prevent an employee from a fall over an edge.

## Fall Protection Locations

The following locations may be potential fall hazards (if not properly protected by guardrails, parapet walls, etc.) requiring the use of a conventional fall protection system.

- Steep pitched roofs.
- Flat roofs and low sloped roofs (4:12 pitch or less) - unless a 42” parapet wall or guardrail is installed and is protecting all open edges. See “Designated Area” (p5).
- Fixed ladders
- Use of aerial lifts
- Mezzanine, balcony, working-walking surfaces, catwalks with open edges or fall through hazards. Whenever an employee must step outside the catwalk, additional fall protection (full body harness, self-retracting lanyard or rope grab system) must be used.
  
- Open excavations or pits greater than four feet deep. (require a warning line and caution signs at least six feet from the open pit)
- Tasks requiring use of the man lifts.
- Tasks requiring employees to lean outside the vertical rails of ladders (i.e., painting, stairwell light bulb replacement, etc.) when man lifts are not



## Safety and Risk Management Policies and Procedures Fall Protection Policy

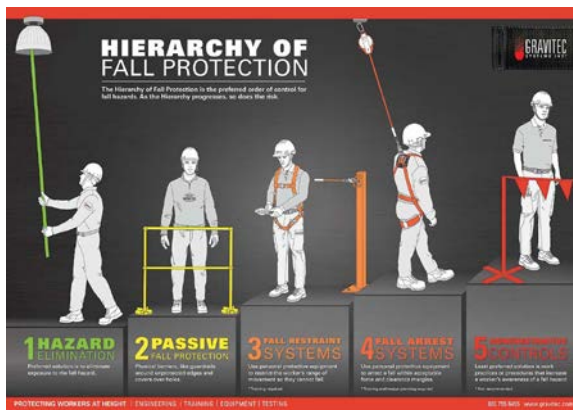
- feasible or when ladder position is near an edge & fall to lower level is possible.
- Skylights – skylights should be protected with safety screens or guardrails meeting OSHA criteria
  - Theater- refer to Theater Department Procedures

The procedure for hanging and/or focusing lights or equipment may require the need for work leaning through catwalk guardrails or removing mid-rails (example – Theater Dept.).

1. **Catwalks:** Catwalks are equipped with railings to protect from falls. Catwalk railings should not be removed unless some other form of fall protection is employed (harness attached to anchor point).
2. **Balcony/gridiron:** Personal fall arrest systems are required whenever working outside the guardrail system.

**Falling Object Hazards:** Ensure a procedure is developed and implemented to provide protection from falling objects. Secure all tools and/or equipment that could fall with tool belts, pouches or safety lines and be sure area below is completely clear of all persons (safety monitor near stage in Theater areas).

### Fall Protection Guidelines



### Warning Signs

Install fall protection signs at appropriate locations – especially at fixed ladders with roof hatches and at other roof access points across campus.



### Limiting Roof or other Fall Hazard Areas Access

Departments that have control of the work task or area are responsible to restrict access to the roof (or other fall hazard areas) to authorized employees. As part of this system, roof access hatches are locked to prevent unauthorized access, and employees who have been trained in fall protection awareness (to recognize, evaluate and control fall hazards) are allowed access to the roof or other fall hazard area.



### Training

Department Heads/Supervisors are responsible to arrange for fall protection training and review of this fall protection policy for all affected employees under their control. All employees engaged in tasks that create fall hazards will be trained and have the knowledge to:

- 1) Recognize the fall hazards of tasks and on their job sites.
- 2) Understand the hazards associated with working near fall hazards.
- 3) Work safely in hazardous areas by utilizing appropriate fall protection measures or systems to prevent injuries.

Understand and follow components of this fall protection policy/program.

### Fall Hazard Analysis

Department/Supervisor is responsible to ensure each person authorized to perform work on a roof or other unprotected edge that exposes an employee to a fall hazard should mentally conduct a hazard analysis that reviews elements of the job task and identifies a fall protection method that is effective with the tasks to be performed.



### **Engineering Controls**

The first line of defense in addressing a fall hazard is to identify and eliminate the hazard. This should always be the first option whenever possible (e.g., light bulb changing telescoping arm, relocate work or process at ground level, etc.) or utilizing a trained/experienced contractor in extremely hazardous areas or tasks (tree trimming).

### **Guardrails**

Guardrails can be made from steel, wood, and wire rope will be acceptable. Guardrail systems should contain a 42" high top-rail, a 21" mid-rail and toe-board, which can withstand 200 pounds of force in any direction. Guardrails should be placed in the following areas if necessary or feasible based on job location or requirements:

- 1) On all open sided floors/walkways. Guardrails can be used in connection with warning line system to create "Designated areas" for employees to work on roofs.
- 2) Around open excavations or pits – construction grade stakes & warning lines with flags posted every 6' may be used if less than 4' deep. Construction grade fence with substantial staking or guardrails should be used for all excavations/pits 4' or greater.

### **Personal Fall Protection Systems**

A personal fall arrest or restraint system will follow these guidelines:

- 1) A full body harness will be used.
  - Anchor points (rated at min. 5000 pounds per person attached – unless certified by engineer = 3600 pounds per person).
  - Restraint line - only nylon rope or nylon straps with locking snap-hooks are to be used (1000 lb per person anchor).
  - Shock absorbing lanyard with self-locking snap-hooks (min. 5000 lb breaking strength).
  - Retractable lanyard – limit free fall to 2' – (min. 3000 lb tensile load capacity).
  - Rope grabs.
  - Connectors (self-locking snap-hooks).
- 2) The employee will inspect all personal fall arrest equipment before each use. Any deteriorated, bent, damaged, impacted, and/or harness showing excessive wear will be removed from service and tagged for repair/replacement.
- 3) An observer with cell phone/radio or immediate access to a phone will be present for the duration of the task.



### Calculating Total Fall Distance

In General: total length of shock absorbing lanyard (free fall) (6') + deceleration distance (3.5') + harness stretch (1') + the location distance of the D-ring from the work surface (5' if standing) + safety factor of 2'. For a 6' lanyard = 17.5' is needed to clear.

Note:

- If the anchorage point is below the attachment point on the worker, the distance between the anchorage point and the attachment point must be added to the length of the lanyard to obtain the free-fall distance.
- If the anchorage point is above the attachment point on the worker, the distance between the anchorage point and the attachment point must be subtracted from the length of the lanyard to obtain the free-fall distance.

### Engineered Lifeline

Lifeline systems must be designed and approved by an engineer or qualified person. Lifeline systems must be engineered to have appropriate anchorages, strength of line designed to hold X number of individuals connected to it, line strength to aid in the arrest of a fall, and durability to hold a fallen employee(s) suspended until a rescue can occur.

### Designated Area - Warning Line System ( > 6' from edge to 15' from edge)

For work on a flat roof or very low pitched roof (4:12 pitch or less [10 degree) - where risk of fall is very minimal, which is performed more than 6 feet from the edge of the roof : consideration can be given to installing an approved "Warning Line" if the work is temporary and infrequent (OSHA definition).

Warning Lines will consist of the following:

- 1) Will be erected 6 feet or more from the edge of the roof.
- 2) Be constructed of stationary weighted posts made of wood or metal.
- 3) Wire or nylon rope and "Caution" tape will be strung from post to post and must be able to withstand 16 pounds of force without showing signs of sag.
- 4) The warning line will guard the entire perimeter of the roof where work is being performed to create a safe work zone.

**NOTE:** For flat or low sloped roofs - if an employee must access an area within 6 feet of the roof's edge, for reasons other than exiting the roof via a ladder or fixed industrial ladder then conventional fall protection system must be used (guardrails, fall restraint system, fall arrest system).



### **Specific Fall Protection Methods**

**Roof access hatches.** Roof access hatches pose openings that must be protected. The simplest approach to controlling this hazard is to simply close the hatch cover once on the roof. Precautions must be taken, however, to ensure that the cover will not latch in a way that prohibits exit. If the hatch must be kept open -- for example, to pass up tools and materials -- the opening must be protected with a guardrail, or employees must use personal fall arrest equipment during the time they are exposed.

**Unprotected edges.** If work such as inspection, maintenance and repair is performed at an unprotected edge, employees must be protected by a conventional fall protection method such as guardrails or personal fall arrest systems. In some situations, it may be possible to perform the work from the ground using ladders or articulated aerial lifts. Work performed on roof locations other than at unprotected edges might be most practically addressed by establishing a “designated area”.

**Skylights.** Skylights may be protected by covers or guardrails. Alternatively, employees working around skylights may be protected with personal fall arrest systems. As noted previously, the best method of protection depends on the nature of the work activities. For example, when employees are exposed because of work that they are performing on the roof, the skylight could be protected by a guardrail system or a cover. If work such as removal, replacement or reglazing is being done on the skylight itself, a personal fall arrest system may be more appropriate.



### **Inspection of Fall Protection Systems – (See Appendix Sections for Inspection Forms)**

Department/Supervisor is responsible to ensure the following criteria will be utilized to maintain all equipment in good working condition:

#### **Full Body Harnesses**

- 1) Inspect before each use.



- 2) A competent person will complete an annual inspection of all harnesses and documentation will be maintained (see Appendix 1).
- 3) Storage will consist of hanging in an enclosed cabinet, to protect from damage.
- 4) All harnesses that are involved in a fall will be destroyed.

#### **Lanyards/Shock Absorbing Lanyards**

- 1) Inspect before each use.
- 2) A competent person will complete an annual inspection of all lanyards and documentation will be maintained (see Appendix 2).
- 3) Storage will consist of hanging in an enclosed cabinet, to protect from damage.
- 4) All lanyards that are involved in a fall will be destroyed.

#### **Snap-hooks**

- 1) Inspect before each use.
- 2) A competent person will complete an annual inspection of all snap-hooks and documentation will be maintained (see Appendix 3).
- 3) All snap-hooks involved in a fall will be destroyed.

#### **Self-Retracting Lanyards/Lifelines**

- 1) Inspect before each use.
- 2) A competent person will conduct monthly inspection of all self-retracting lanyards/lifelines and documentation will be maintained (see Appendix 4).
- 3) Service per manufacturer specifications (1-2 years).
- 4) Inspect for proper function after every fall.

#### **Tie-Off Adapters/Anchorages**

- 1) Inspect for integrity and attachment to solid surface.
- 2) A competent person will complete an annual inspection of all tie-offs and anchorages and documentation will be maintained.
- 3) All tie-offs and anchorages will be destroyed after a fall.

#### **Articulating Man Lift**

- 1) Inspect before each use.
- 2) Inspect/service per manufacturer guidelines. Scissor lifts will be inspected at the beginning of each shift in use.

#### **Horizontal Lifelines**

- 1) Inspect before each use for structural integrity of line and anchors.
- 2) A competent person will complete an annual inspection.

#### **Guardrails**





- 1) Temporary systems – Daily visual inspection will be completed by a competent person.
- 2) Permanent systems – Annual structural inspections will be completed by a competent person.

### **Storage and Maintenance of Fall Protection Equipment**

- 1) Never store the personal fall arrest equipment in the bottom of a toolbox, on the ground, or outdoors exposed to the elements (i.e., sun, rain, snow, etc.).
- 2) Hang equipment in a cool, dry location in a manner that retains its shape.
- 3) Always follow manufacturer recommendations for inspections.
- 4) Clean with a mild, nonabrasive soap and hang to dry.
- 5) Never force dry or use strong detergents in cleaning.
- 6) Never store equipment near excessive heat, chemicals, moisture, or sunlight.
- 7) Never store in an area with exposures to fumes or corrosive elements.
- 8) Avoid dirt or other types of build-up on equipment.
- 9) Never use this equipment for any purpose other than personal fall arrest.
- 10) Once exposed to a fall, remove equipment from service immediately.

### **Enforcement**

Departments/supervisors are responsible to enforce all safety program components, set expectations and ensure their employees follow safe work practices.

### **Rescue Procedures**

Observer is required to have cell phone/radio for all work with use of Fall Protection System.

#1. Call 911 & SU Police. If feasible, Physical Plant should provide for use of an articulating man lift or ladder rescue.

At the beginning of any work activity where fall protection is an issue, rescue plans should be identified by the supervisor and discussed with affected employees in case of a fall. Rescue for an unconscious fall victim should be within 15 – 20 minutes to reduce the effects of suspension trauma.

All employees involved in a fall arrest or fall should be sent immediately for a medical evaluation to determine the extent of injuries (potential for internal injuries), if any.

**Full Body Harness****Annual Inspection Checklist**

Harness Model/Name: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Lot Number: \_\_\_\_\_

Date of Manufacture: \_\_\_\_\_ Date of Purchase: \_\_\_\_\_

Comments: \_\_\_\_\_

<b>General Factors</b>	<b>Accepted/Rejected</b>	<b>Supportive Details/Comments</b>
1) <b>Hardware:</b> includes D-rings, buckles, keepers and back pads. Inspect for damage, distortion, sharp edges, burrs, cracks and corrosion.	Accepted Rejected	
2) <b>Webbing:</b> Inspect for cuts, burns, tears, abrasions, frays, excessive soiling and discoloration.	Accepted Rejected	
3) <b>Stitching:</b> Inspect for pulled or cut stitches.	Accepted Rejected	
4) <b>Labels:</b> Inspect, making certain all labels are securely held in place and are legible.	Accepted Rejected	
5) Other:	Accepted Rejected	
6) Other:	Accepted Rejected	
7) <b>Overall Disposition:</b>	Accepted Rejected	<b>Inspected By:</b>  <b>Date Inspected:</b>

## Lanyards

## Annual Inspection Checklist

Lanyard Model/Name: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Lot Number: \_\_\_\_\_

Date of Manufacture: \_\_\_\_\_ Date of Purchase: \_\_\_\_\_

Comments: \_\_\_\_\_

General Factors	Accepted/Rejected	Supportive Details/Comments
1) <b>Hardware:</b> (includes snaphooks, carabiners, adjusters, keepers, thimbles and D-rings) Inspect for damage, distortion, sharp edges, burrs, cracks, corrosion and proper operation.	Accepted Rejected	
2) <b>Webbing:</b> Inspect for cuts, burns, tears, abrasions, frays, excessive soiling and discoloration.	Accepted Rejected	
3) <b>Stitching:</b> Inspect for pulled or cut stitches	Accepted Rejected	
4) <b>Synthetic Rope:</b> Inspect for pulled or cut yarns, burns, abrasions, knots, excessive soiling and discoloration.	Accepted Rejected	
5) <b>Energy Absorbing Component:</b> Inspect for elongation, tears and excessive soiling.	Accepted Rejected	
6) <b>Labels:</b> Inspect, making certain all labels are securely held in place and are legible.	Accepted Rejected	
<b>Overall Disposition:</b>	Accepted Rejected	<b>Inspected By:</b>  <b>Date Inspected:</b>

Snap-hooks/Carabiners

## Annual Inspection Checklist

Hook/Carabiner Model/Name: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Lot Number: \_\_\_\_\_

Date of Manufacture: \_\_\_\_\_ Date of Purchase: \_\_\_\_\_

Comments: \_\_\_\_\_

General Factors	Accepted/Rejected	Supportive Details/Comments
1) <b>Physical Damage:</b> Inspect for cracks, sharp edges, burrs, deformities and locking operations.	Accepted Rejected	
2) <b>Excessive Corrosion:</b> Inspect for corrosion, which affects the operation and/or the strength.	Accepted Rejected	
3) <b>Markings:</b> Inspect and make certain marking(s) are legible.	Accepted Rejected	
4) Other:	Accepted Rejected	
5) Other:	Accepted Rejected	
6) Other:	Accepted Rejected	
<b>Overall Disposition:</b>	Accepted Rejected	<b>Inspected By:</b> <b>Date Inspected:</b>

**Self-Retracting Lanyard/Lifeline****Annual Inspection Checklist**

Self-Retracting Lanyard/Lifeline Model/Name: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Lot Number: \_\_\_\_\_

Date of Manufacture: \_\_\_\_\_ Date of Purchase: \_\_\_\_\_

Department/Location: \_\_\_\_\_

Comments: \_\_\_\_\_

<b>General Factors</b>	<b>Accepted/Rejected</b>	<b>Supportive Details/Comments</b>
1) <b>Impact Indicator:</b> Inspect indicator for activation (rupture of red stitching, elongated indicator, etc.).	Accepted Rejected	
2) <b>Screws/Fasteners:</b> Inspect for damage and make certain all screws and fasteners are tight.	Accepted Rejected	
3) <b>Housing:</b> Inspect for distortion, cracks and other damage. Inspect anchoring loop for distortion or damage.	Accepted Rejected	
4) <b>Lanyard/Lifeline:</b> Inspect for cuts, burns, tears, abrasion, frays, excessive soiling and discoloration. (See impact indicator section.)	Accepted Rejected	
5) <b>Locking Action:</b> Inspect for proper lock-up of brake mechanism.	Accepted Rejected	
6) <b>Retraction/Extension:</b> Inspect spring tension by pulling lanyard out fully and allowing to retract fully (lifeline must be taut with no slack).	Accepted Rejected	
7) <b>Hooks/Carabiners:</b> Inspect for physical damage, corrosion, proper orientation and markings.	Accepted Rejected	
8) <b>Labels:</b> Inspect, making certain all labels are securely held in place and are legible.	Accepted Rejected	
<b>Overall Disposition:</b>	Accepted Rejected	<b>Inspected By:</b>  <b>Date Inspected:</b>



## Definitions

**Aerial Lift** - Work activities that are performed with an aerial lift must be in conformance with **OSHA 29 CFR 1910.67 Vehicle Mounted Elevating and Rotating Work Platforms**. Basic requirements include, but are not limited to:

- Initial training is required to operate aerial lifts. Generally, the equipment manufacturer or distributor can provide operator training.
- Articulated and extensible boom platforms must have both platform (operator controls) and lower controls.
- The Operator must test the controls each day to determine that the controls are in a safe working condition.
- Body harnesses must be worn with a shock absorbing lanyard, (preferably not to exceed three feet in length). The point of attachment must be the aerial lift's boom or work platform. Personnel cannot attach lanyards to adjacent poles, structures or equipment while they are working from an aerial lift.
- Personnel cannot move an aerial lift while the boom is in an elevated working position and the operator is inside of the life platform.

**Authorized Person:** A person approved or assigned by the employer to perform a specific type of duty or duties or to be at a specific location or job site (i.e., building maintenance, roof repair, etc.).

**Competent Person:** A person capable of identifying existing and predictable hazards in the surroundings or working conditions, which are hazardous or dangerous to employees; a person who has the authorization to take prompt corrective action to eliminate such hazards.

**Qualified Person:** An individual, who by possession of a recognized degree, certificate, or professional standing or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems relating to the subject matter, work, or project.

**Anchor Point:** A secure point of attachment for lifelines, lanyards, or deceleration devices. An anchor point must be capable of supporting at least 5000 pounds (3600 pounds if engineered/certified by a qualified person) per person and must be independent of any anchorage being used to support or suspend platforms.

**Fall protection** is not technically required by OSHA if an employee is on a low slope or flat roof for inspection purposes only or to initially install fall protection anchors or guardrails on flat or low-sloped roof. This does not make it safe because it is allowed. **Fall protection is strongly urged even for short duration inspection purposes whenever there is a risk of falling.**

**Full Body Harness:** Webbing/straps that are secured about an employee's body in a manner that will distribute the fall arrest forces over the thighs, pelvis, waist, chest and shoulders. Having means for attaching it to other components of a personal fall arrest system, preferably at the shoulders and/or middle of the back.

**Connector:** A device that is used to couple (connect) parts of the personal fall arrest system together.

**Deceleration Device:** Any mechanism, such as a rope grab, rip-stitch lanyard, a specially woven lanyard, tearing or deforming lanyard, automatic self-retracting lifeline/lanyard, etc., which serves to dissipate a substantial amount of energy during a fall arrest.

**Deceleration Distance:** The additional vertical distance a falling employee travels excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's body harness attachment point at the moment of activation of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

**Designated Area** – defined as a distinct portion of a walking-working surface delineated by an approved warning line system in which employees may perform work without traditional fall protection systems. A designated area may be used on flat or low-slope roof if work is performed more than 6 feet from the edge AND work is both temporary and infrequent. This warning line system may not provide sufficient protection and should be reviewed carefully and considered when other fall protection options are not feasible. The warning line is not designed to hold or prevent a person from falling but serves as a visual warning line not to cross. Temporary is defined as usually takes one to two hours to complete the task. Infrequent is defined as a task that is performed at intervals once per month to once per year (also includes when access is necessary when a piece of equipment breaks down). On flat or low-sloped roofs - if work to be performed is greater than 15 feet from an open edge, is temporary, infrequent AND a fall protection plan (rule) is in place that prohibits employees from getting within 15 feet of the edge – then there is an exemption to allow an employer not to provide traditional fall protection systems.

**Warning Line Strength criteria.** (i) After being erected with the line (such as rope, wire or chain) attached, stanchions shall be capable of resisting, without tipping over, a force of at least 16 pounds (71 N) applied horizontally against the stanchion. The force shall be applied 30 inches (76 centimeters) above the work surface and perpendicular to the designated area perimeter, and in the direction of the unprotected side or edge;

(ii) The line shall have a minimum breaking or tensile strength of 500 pounds (2.2 kN) and, after being attached to the stanchions, shall be capable of supporting, without breaking, the load applied to the stanchions as prescribed in paragraph (d)(2)(i) of this section; and

(iii) The line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.



**Warning Line Height criteria.** The line shall be installed in such a manner that its lowest point, including sag, is no less than 34 inches (86 cm) nor more than 39 inches (1 meter) from the work surface.

**Warning Line Visibility criteria.** The line forming the designated area shall be clearly visible from any unobstructed location within the designated area up to 25 feet (7.6 m) away, or at the maximum distance a worker may be positioned away from the line, whichever is less.

**Warning Line Location criteria.** (i) Stanchions shall be erected as close to the work area as permitted by the task.

(ii) When mechanical equipment is being used, the line shall be erected not less than 6 feet (1.8. m) from the unprotected side or edge that is parallel to the direction of mechanical equipment operation and not less than 10 feet (3.1 m) from the unprotected side or edge that is perpendicular to the direction of mechanical equipment operation.

(iv) Access to the designated area shall be by a clear path, formed by two lines, attached to stanchions that meet the strength, height and visibility requirements of this paragraph.

**Free Fall:** The act of falling before a personal fall arrest system begins to apply force to arrest the fall.

**Free Fall Distance:** The vertical displacement of the fall arrest attachment point on the employee's body harness between the onset of the fall and just before the system begins to apply force to arrest the fall. Free fall distance must not exceed 6 feet. **This distance excludes deceleration distance and lifeline/lanyard elongation distance.**

**Total Fall Distance:** The maximum vertical change in distance from the bottom of an individual's feet at the onset of a fall, to the position of the feet after the fall is arrested. This includes the free fall distance and the deceleration distance.

**Guardrail System:** A barrier erected to prevent employees from falling to lower levels. This system includes a toe-board, mid-rail and top-rail able to withstand 200 pounds of force applied in any direction.

**Lanyard:** A flexible line of rope or strap that has self-locking snap hook connectors at each end for connecting to body harnesses, deceleration devices, and anchor points.

**Leading Edge:** The edge of a floor, roof, or other walking/working surface, which changes location as additional floor, roof, etc., is placed or constructed. A leading edge is considered an unprotected side or edge when not under active construction.

**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). This serves as a means for connecting other components of a personal fall arrest system to the anchorage.

**Low Slope Roof:** A roof having a slope of less than, or equal to, 4 in 12 (vertical to horizontal). A roof with approximately a 19.5 degree slope or less.

**Personal Fall Arrest System:** A system used to arrest (catch) an employee in a fall from a working level. It consists of an anchorage location, connectors, a body harness, and may include a lanyard, deceleration device, lifeline, or any combination of the before-mentioned items.

**Rope Grab:** A deceleration device, which travels on a lifeline and automatically, by friction, engages the lifeline and locks to arrest the fall of an employee.

**Roof Work:** The hoisting, storage, installation, repair, and removal of materials or equipment on the roof.

**Safety Monitoring System:** A safety system in which a competent person is responsible for recognizing and warning employees of fall hazards. All other fall protection systems must be deemed “infeasible” (through infeasibility study/review) to select/use a safety monitoring system. A safety monitoring system is used in conjunction with a warning line.

**Snap-hook:** A connector comprised of a hook-shaped member with a closed keeper which may be opened to permit the hook to receive an object and when released, automatically closes to retain the object. Snap-hooks must be self-closing with a self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection, thus preventing the opportunity for the object to “rollout” of the snap-hook.

**Steep Slope Roof:** A roof having a slope greater than 4 in 12 (vertical to horizontal). A roof with a slope greater than 19.5 degrees.

**Toe-board:** A low protective barrier that will prevent the fall of materials and equipment to lower levels, usually 4 inches or greater in height.

**Unprotected Sides and Edges:** Any side or edge of a walking or working surface (e.g., floor, roof, ramp, runway, etc.) where there is no guardrail at least 39 inches high.

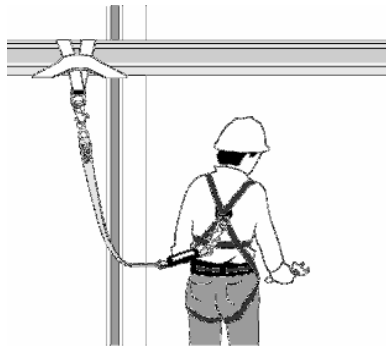
**Warning Line System:** A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, which designates an area in which work can be conducted without the use of guardrails, personal fall arrest systems, or safety nets to protect employees in the area. This will be utilized on any roof greater than 50 feet wide and in conjunction with a safety monitor only where the other forms of fall protection have been deemed infeasible to use.

## APPENDIX – Graphic Examples and Information

### Personal Fall Arrest Systems

#### Anchorage

An **anchorage point** is a secure point of attachment for lifelines, lanyards, deceleration devices, or self retracting lanyards.



The anchorage point can be a single attachment to a substantial structure above the surface from which the employee is working, or it can be one to two attachments used to anchor a vertical or horizontal lifeline.

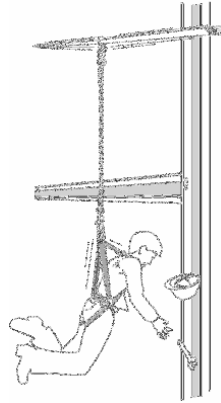
Remember - The anchorage point for fall arrest systems must be capable of supporting **5000 lb.** for each worker or used as part of a complete PFAS which maintains a safety factor of at least two and under the supervision of a qualified person.

A **qualified person** is defined as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his/her ability to solve or resolve problems relating to the subject matter, the work, or the project.

#### **Full Body Harness**

The impact of the fall is imposed on the trunk of the body which distributes the maximum arresting force (MAF) to a larger area than the safety belt, reducing the potential for damage to the body.

Safety & Risk Management Policies and Procedures  
Fall Protection Policy and Procedure



OSHA allows a maximum of **1800 lbs. MAF** when using a full body harness. OSHA prohibits the use of a safety belt for personal fall arrest.



The attachment point (D-Ring) must be located in the center of the wearer's back near shoulder level.

**Connector**

**Connector** means a device which is used to connect parts of the PFAS and positioning devices together. Connectors include everything between your harness and anchor.



Connectors include lanyards, snap-hooks, carabineers, D-Rings, lifelines, and deceleration devices.

- **Lanyards** are devices which connect the worker to the anchorage point

- o used to connect the two front D-Rings to the anchorage point for positioning
- o secured at one end to the worker's harness D-Ring and the other end to the anchorage point for fall arrest
- Lanyards must be made from synthetic material and have a minimum breaking strength of 5000 lbs.
- Only locking-type *snap-hooks* and *carabineers* can be used
- The following connections are prohibited (unless the locking type snap-hook is designed for it):
  - o engaged directly to webbing, rope, or wire rope
  - o engaged to another snap-hook
  - o engaged to a D-Ring to which another snap-hook/carabineer is attached
  - o engaged to a horizontal lifeline
  - o engaged to any object which is incompatibly shaped or dimensioned such that unintentional disengagement can occur (roll out)

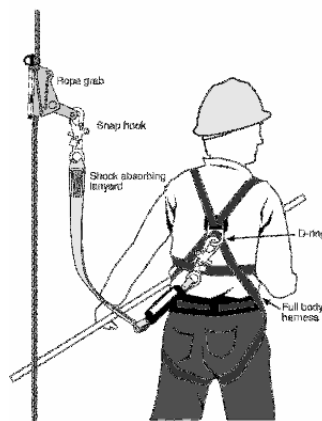
### **Deceleration Device**

**Deceleration device** means any mechanism that dissipates a substantial amount of energy imposed on an employee during fall arrest. Deceleration devices include rope grabs, rip-stitch/tearing lanyards, and self-retractable lanyards.

**Remember** - maximum arresting forces on an employee during a fall arrest must be less than 1800 lbs.

**Lifelines** are flexible lines that connect to an anchorage point at one end to hang vertically, or at both ends to stretch horizontally.

Vertical lifelines are to be used by only one person, and with a rope grab.



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Horizontal lifelines can be used only as part of a complete PFAS that maintains a safety factor of at least two, **and** when designed, installed, and used under the supervision of a qualified person.



Fall Restraint System



Passive System - Guardrails



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Fall Harness with Twin Leg Self Retracting Lifeline with Hooks  
(Typically used to climb fixed ladders)



**Cable Sleeve Connector & Fall Protection Harness – fixed ladder safety system**



### Personal Fall Arrest Systems - The Fall4

The free fall velocity at impact when falling 12 feet is nearly 20 mph. Put another way, a person will hit the ground in just under one second after falling this distance.

A free fall is defined as the act of falling before a personal fall arrest system begins to apply force to arrest the fall. When a fall is experienced using a PFAS, the fall is referred to as a free fall up until the system starts to arrest the fall to stop the fall.

OSHA regulations allow no more than a **six-foot** free fall distance.

When the fall does come to a complete stop, the action is referred to as the fall arrest. Tremendous force is imposed on the body during the fall arrest. This force imposed during the arrest is known as the ***arrest force***. Forces imposed in a fall greatly depend on the type of system you are using and the free fall distance.

For example: A 220 lb. worker:

Free falling 2 ft. using a wire rope lanyard (without a deceleration device) = approx. 3917 lbs. Note – self-retracting lifeline with wire rope has a deceleration device built in)

Free falling 4 ft. using a nylon rope lanyard (without a deceleration device) = approx. 2140 lbs.

Free falling 6 ft. using a synthetic web lanyard (with a deceleration device) = <900 lbs.

OSHA sets limits on the Maximum Arrest Force (MAF). The law prohibits the use of a safety belt for fall arrest and allows a maximum of **1800 lbs.** when using a full body harness.

#### Calculating Free Fall Distance:

#### Calculating Total Fall Distance

In General: total length of shock absorbing lanyard (free fall) (6') + deceleration distance (3.5') + harness stretch (1') + the location distance of the D-ring from the work surface (5' if standing) + safety factor of 2'. For a 6' lanyard = typically 17.5' is needed to clear.

Note:

- If the anchorage point is below the attachment point on the worker, the distance between the anchorage point and the attachment point must be added to the length of the lanyard to obtain the free-fall distance.
- If the anchorage point is above the attachment point on the worker, the distance between the anchorage point and the attachment point must be subtracted from the length of the lanyard to obtain the free-fall distance.



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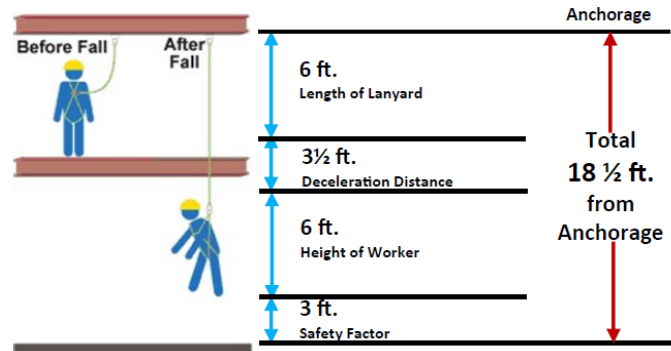
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### Calculating Fall Clearance using a Shock Absorbing Lanyard

Example:

- First, add the length of the shock absorbing lanyard (6 ft.) to the maximum elongation of the shock absorber during deceleration (3 ½ ft.) to the average height of a worker (6 ft.)
- Then, add a safety factor of 3 ft. to allow for the possibility of an improperly fit harness, a taller than average worker and/ or a miscalculation of distance.
- The total, 18 ½ ft. is the suggested safe fall clearance distance for this example.

*NOTE: Should the shock absorbing lanyard be used in conjunction with a cross-arm anchorage connector or other, the additional length of the anchorage connector must be taken into consideration.*

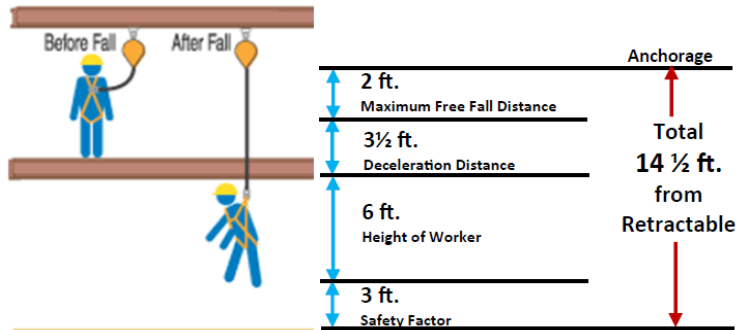


### Calculating Fall Clearance using a Self-Retracting Lifeline

Example:

- First, add the maximum free fall distance (2 ft.) with a retractable lifeline to the maximum deceleration distance (3 ½ ft.) to the average height of a worker (6 ft.)
- Then, add a safety factor of 3 ft. to allow for the possibility of an improperly fit harness, a taller than average worker and/ or a miscalculation of distance.
- The total, 14 ½ ft. is the suggested safe fall clearance distance for this example.

*NOTE: When using a retractable lifeline, the distance is calculated from the point where the retractable attaches to the back D-ring of the worker's harness.*



### Eliminate Electrical Hazards

- Instruct crew members on location of all sources of electrical power and proper work practices including that equipment must be grounded or double insulated
- Tag, barricade and post warning signs in hazardous areas
- Watch distances when transporting ladders, or scaffolds, or other materials
- Flag roof mounted weather heads to prevent tripping or falling over power lines

### Minimum Safe Distance From “High Voltage”

Power line voltage Phase to phase (kV)	Minimum safe clearance (feet)
50 or below	10
0 – 300 volts	Avoid actual contact
300 or greater volts	10 feet

- Non-electrical workers must stay at least 10 feet away from overhead power lines
- Electrical workers must de-energize/insulate power lines or use proper PPE/equipment
- Use insulated buckets near overhead power lines
- Regularly check insulation on buckets

### **Work from Aerial Lifts and Self Powered Work Platforms**

Body harnesses must be worn with a shock-absorbing lanyard (preferably not to exceed 3 feet in length) and must be worn when working from an elevated work platform (exception: scissor lifts do not require the use of a harness and lanyard (OSHA) as long as the work platform is protected by a guardrail system). The point of attachment must be the lift's boom or work platform. SU requires fall arrest or restraint system for scissor lifts due to the nature of workers elevating themselves for tasks. This would require fall arrest/restraint by OSHA.

#### **Before Operating Aerial Lifts**

- Check safety devices, operating controls before each use
- Check area in which aerial lift will be used for to ensure it is level and free of holes, drop-offs, bumps, and overhead obstructions and overhead power lines
- Set outriggers, brakes, wheel chocks

#### **Preventing Tip-Overs**

- Do not exceed manufacturer rated load capacity limits
  - Do not travel to job location with lift in elevated position
  - Set up proper work zone protection when working near traffic
  - Do not raise platform on uneven or soft surfaces
  - Do not raise platform in windy or gusty conditions
  - Avoid excessive horizontal forces when working on elevated scissor lifts
- Check with your unit safety officer or installation safety office for training.

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Date:

Approved (signature and date):

Supervisor \_\_\_\_\_

Director of Physical Plant \_\_\_\_\_

AVP for Facilities \_\_\_\_\_

Vice President for Fiscal Affairs If needed \_\_\_\_\_

Copy:

All supervisors \_\_\_\_\_

Related crafts \_\_\_\_\_

Department Heads \_\_\_\_\_

VP's \_\_\_\_\_

President \_\_\_\_\_

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Chutes – attached to a hole	B
Chutes – attached to an opening	D
Dangerous equipment, hazardous materials or conditions	B
Electrical work	B
Hatchways – hole created by the hatchway	B
Holes – tripping or stepping into or through hole less than 4 feet deep	B
Impalement hazards	B
Ladder (fixed) – extend more than 24 feet above a lower level	> 24'
Ladder work (portable) both hands used for work task	C
Mobile Elevating Work Platforms (MEWPs):	
Aerial lifts – vehicle-mounted elevating and rotating work platforms	A
Boom supported elevating work platforms	A
Scissor lifts	B
Openings – floor: 12 inches or greater in diameter wall: at least 30 inches high X 18 inches wide	D
Powered industrial truck (forklift) – personnel platforms	B
Roof – low slope (less than 4:12), unguarded edge, leading edge work	A
Roof – low slope, unguarded edge, roofing work	B
Roof – low slope, unguarded edge, work other than leading edge/roofing	B
Roof – steep slope (greater than 4:12) unguarded edge, any work	A
Runways and similar walkways	D
Scaffolds – supported and suspended	C
Scaffold erecting	≥ 6'
Skylights	D
Stairs – four or more risers or greater than 30 inches high	B
Stairways – opening created by the stairway	B
Tree work	B
Unguarded sides and edges (floors, stairs, roofs, ramps, bridges, loading docks)	D
Walking-working surface not otherwise addressed	D
Window washing	B

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A = Personal fall arrest or restraint system required

B = Appropriate fall protection system required

C = Fall protection system required at heights greater than the listed height

D = Fall protection system required at heights that are equal to or greater than the listed height

≥ = greater than or equal to

> = greater than