



# Environmental Health and Safety

EAST TEXAS A&M

## Fall Protection Program



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## Fall Protection Requirements

This Program prescribes the duty to provide fall protection, sets the criteria and practices for fall protection systems, and required training.

In the construction industry in the U.S., falls are the leading cause of worker fatalities. Each year, on average, between 150 and 200 workers are killed and more than 100,000 are injured as a result of falls at construction sites alone.

Standards for fall protection deal with both the human and equipment-related issues in protecting workers from fall hazards. Employers and employees are required to do the following:

- Where protection is required, select fall protection systems appropriate for given situations.
- Use proper construction and installation of safety systems.
- Supervise employees properly.
- Use safe work procedures.
- Train workers in the proper selection, use, and maintenance of fall protection systems.

This Program covers everyone except those inspecting, investigating, or assessing workplace conditions prior to the actual start of work or after all work has been completed.

This Program identifies areas or activities where fall protection is needed. These include, but are not limited to, Ariel / scissor lifts, ramps, runways, and other walkways, excavations, hoist areas, holes, formwork and reinforcing steel, leading edge work, unprotected side and edges, overhand bricklaying and related work, roofing work, precast concrete erection, wall openings, residential construction, and other walking/working surfaces. The rule sets a uniform threshold height of 6 feet, thereby providing consistent protection. This means that employers must protect employees from fall hazards and falling objects whenever an affected employee is 6 feet or more above a lower level. Protection also must be provided for workers who are exposed to the hazard of falling into dangerous equipment.

## General Fall Protection

Employers must assess the workplace to determine if the walking or working surfaces on which employees are to work have the strength and structural integrity to safely support the workers. Once the employer has determined that the surface is safe for the employees to work on, the employer must provide the proper fall protection for the fall hazard that is present. The employer must provide fall protection for employees, after identifying and evaluating fall hazards and providing specific training.

## Controlled Access Zones

A controlled access zone is a work area designated and clearly marked in which certain types of work (such as overhand bricklaying) may take place without the use of conventional fall protection systems-guardrail, personal arrest or safety-net to protect the employees working in the zone. Controlled access zones are used to keep out workers other than those authorized to enter work areas from which guardrails have been removed. Where there are no guardrails, masons are the only workers allowed in controlled access zones. Controlled access zones, when created for leading edge work is taking place, must be defined by a control line or by any other means that restricts access. Control lines shall consist of ropes, wires, tapes or equivalent materials, and supporting stanchions, and must be:

- Flagged or otherwise clearly marked at not more than 6- foot intervals with high-visibility material.
- Rigged and supported in such a way that the lowest point is not less than 39 inches from the walking/working surface and the highest point is not more than 45 inches (50 inches for overhand bricklaying) from the walking/working surface.
- Strong enough to sustain stress of not less than 200 pounds. Control lines shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.
- Control lines also must be connected on each side to a guardrail system or wall

## Guardrail Systems

If the employer chooses to use guardrail systems to protect workers from falls, the systems must meet the following criteria:

- Toprails and midrails of guardrail systems must be at least one-quarter inch nominal diameter; it must be flagged at not more than 6 feet intervals with high-visibility material, and must be inspected as frequently as necessary to ensure strength and stability. The top edge height of toprails or guardrails must be 42 inches plus or minus 3 inches above the walking/working level.
- When midrails are used, they must be installed at a height midway between the top edge of the guardrail system and the walking/working level and there shall be no openings in the guardrail system more than 19 inches.
- The guardrail system must be capable of withstanding a force of at least 200 pounds applied within 2 inches of the top edge in any outward or downward direction and must not deflect to a height less than 39 inches above the walking/working level.
- Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding a force of at least 150 pounds applied in any downward or outward direction at any point along the midrail or other member.
- When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section must be placed across the access opening between guardrail sections when hoisting operations are not taking place.
- At holes, guardrail systems must be set up on all unprotected sides or edges. When holes are used for the passage of materials, the hole shall not have more than two sides with removable guardrail sections.
- If guardrail systems are around holes that are used as access points (such as ladderways), gates must be used or the point of access must be offset to prevent accidental walking into the hole.
- If guardrails are used at unprotected sides or edges of ramps and runways, they must be erected on each unprotected side or edge.
- Around holes (including skylights) that are more than 6 feet above lower levels.
- Excavation of 6 feet or more deep shall be protected from falling and where walkways are provided to permit foot traffic to cross over excavations, guardrails are required on the walkway if the fall would be 6 feet or more to the lower level.

## Personal Fall Protection Systems

This includes any of the following: an anchorage, connectors, and a full body harness and may include a deceleration device, lifeline, or suitable combinations.

If a personal fall arrest system is used for fall protection, it must do the following:

- Limit maximum arresting force on an employee to 1,800 pounds when used with a body harness;
- Be rigged so that an employee can neither free fall more than 6 feet nor contact any lower levels;
- Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet.
- Have sufficient strength to withstand twice the potential impact energy of an employee freefalling a distance of 6 feet or the free fall distance permitted by the system, whichever is less.

Personal fall protection systems must be inspected prior to each use for wear damage, and other deterioration. Defective components must be removed from service.

Snaphooks shall be sized to be compatible with the member to which they will be connected, or shall be a locking configuration.

Horizontal lifelines shall be designed, installed, and used under the supervision of a qualified person, as part of a complete personal fall arrest system that maintains a safety factor of at least two. Lifelines shall be protected against being cut or abraded.

Full body harnesses are the only acceptable harness and **must be used** at all times on all personnel lifting equipment, including scissor lifts (NO BELT HARNESSSES ALLOWED).

## Safety Monitoring Systems

When no other alternative fall protection has been implemented, the employer shall implement a safety monitoring system. Employers must appoint a competent person to monitor the safety of workers and the employer shall ensure that the safety monitor:

- Is competent in the recognition of fall hazards.
- Is capable of warning workers of fall hazard dangers and in detecting unsafe work practices.
- Is operating on the same walking/working surfaces of the workers and can see them.
- Is close enough to work operations to communicate orally with workers and has no other duties to distract from the monitoring function.

Mechanical equipment shall be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations of low-sloped roofs. No worker, other than one engaged in roofing work (on low-sloped roofs) or one covered by a fall protection plan, shall be allowed in an area where an employee is being protected by a safety monitoring system. All workers in a controlled access zone shall be instructed to promptly comply with fall hazard warnings issued by safety monitors.

## Toeboards

When toeboards are used as protection from falling objects, they must be:

- Erected along the edges of the overhead walking or working surface for a distance sufficient to protect persons working below.
- Capable of withstanding a force of a least 50 pounds applied in any downward outward direction at any point along the toeboard.
- Be a minimum of 3.5 inches tall from their top edge to the level of the walking/working surface, have no more than 0.25 inches clearance above the walking/working surface, and be solid or have openings no larger than 1 inch in size.
- Where tools, equipment, or materials are piled higher than the top edge of a toeboard, paneling or screening must be erected from the walking/working surface or toeboard to the top of a guardrail system's top rail or midrail, for a distance sufficient to protect employees below.

## Hoist Areas

Each employee in a hoist area shall be protected from falling 6 feet or more by guardrail systems or personal fall arrest systems. If guardrail systems (or chain gate or guardrail) or portions thereof must be removed to facilitate hoisting operations, as during the landing of materials, and a worker must lean through the access opening or out over the edge of the access opening to receive or guide equipment and materials, that employee must be protected by a personal fall arrest system.

## Ramps, Runways, and Other Walkways

Each employee using ramps, runways, and other walkways shall be protected by guardrails systems against falling 6 feet or more.

## Steep Roofs

Each employee on a steep roof with unprotected sides and edges 6 feet or more above lower levels shall be protected by either guardrail systems with toeboards, a safety net system, or a personal fall arrest system.

## Wall Openings

Each employee must be protected from falling by the use of either a guardrail system, a safety net system, or a personal fall arrest system when:

- Working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is 6 feet or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface.

# Ladders

Ladders can make many tasks easier, but they are also a continual safety hazard.

Follow these guidelines for safe ladder usage:

- Inspect Ladders
  - If ladder is in poor condition mark it with a “Do Not Use” tag and have it repaired, removed or destroyed.
  - If the load-rating sticker on a ladder is missing or unreadable, replace it, or get a new ladder.
- Choose the Right Type and Size Ladder
  - Never increase a ladder’s height by standing it on top of boxes, barrels, or other objects.
  - Never splice two ladders together.
  - Never use ladders as a platform, runway, or scaffold.
  - Do not use a self-supporting ladder (such as a stepladder) as a straight ladder.
  - Read and follow all ladder labels, instructions, and warnings.
  - Use ladders only as designed.

Ladder Duty Rating				
TOTAL MAX WEIGHT				
Type III Grade 3	Type II Grade 2	Type I Grade 1	Type IA Grade 1A	Type IAA Grade 1AA
<b>200 lbs</b>	<b>225 lbs</b>	<b>250 lbs</b>	<b>300 lbs</b>	<b>375 lbs</b>
Light Duty Household Use	Medium Duty Tradesman and Farm	Heavy Duty Construction/Industrial	Heavy Duty Construction/Industrial	Heavy Duty Max Durability

- Set Up Ladder Properly
  - Allow ample room to step off the ladder safely.
  - Keep the area around the ladder clear of tools and equipment.
  - Set the base of the ladder, so the bottom rests securely, evenly supporting both side rails.
  - Ensure the ladder sits on solid footing against firm support.
  - Use a long enough ladder for the side rails to extend above the top support point by at least three feet.
  - Set leaning ladders at an angle of one foot of distance from the wall for every four feet of vertical height.
  - Tie in, block, or secure the top of the straight ladder to keep it from moving.
  - Unless protective barriers are in place, never set up ladders in doorways or walkways where people can run into them.
  - Never use metal ladders near power lines or exposed, energized electrical equipment. Keep wood or fiberglass ladders at least ten feet from power lines, if possible.
  - Do not run hoses, extension cords, or ropes on a ladder, which may cause the ladder to move unexpectedly or create trip or fall hazards.
- Climb Safely
  - Never stand on a stepladder’s cross braces unless they are designed as a second set of steps.
  - Never stand above a ladder’s topmost safe step (the top step or the top shelf), as indicated on the ladder’s label.
  - Keep your body near the middle of the step, and always face the ladder.
  - Maintain three points of contact with the ladder (using two hands and a foot, or two feet and a hand).
  - Do not try to carry tools or materials up with you if you cannot do so while maintaining three contact points with the ladder.
  - Face the ladder when climbing and keep the body inside the side rails.
  - Avoid tipping the ladder by over-reaching. If something is out of reach, get down and move the ladder closer to the item you are trying to reach.

# Glossary

## **Anchorage**

A secure point of attachment for lifelines, lanyards or deceleration devices.

## **Body harness**

Straps that may be secured about the person in a manner that distributes the fall-arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with a means for attaching the harness to other components of a personal fall arrest system.

## **Connector**

A device that is used to couple (connect) parts of a personal fall arrest system or positioning device system together.

## **Controlled access zone**

A work area designated and clearly marked in which certain types of work (such as overhand bricklaying) may take place without the use of conventional fall protection systems-guardrails, personal arrest or safety net- to protect the employees working in the zone.

## **Deceleration device**

Any mechanism-such as rope, grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards-which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limits the energy imposed on an employee during fall arrest.

## **Deceleration distance**

The additional vertical distance a falling person travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which a deceleration device begins to operate.

## **Guardrail system**

A barrier erected to prevent employees from falling to lower levels.

## **Hole**

A void or gap 2 inches or more in the least dimension in a floor, roof, or other walking/working surface.

## **Lanyard**

A flexible line of rope, wire rope, or strap that generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

## **Leading Edge**

The edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed or constructed.

## **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 arrest system to the anchorage.

## **Low-slope roof**

A roof having a slope less than or equal to 4 in 12 pitch (vertical to horizontal).

## **Opening**

A gap or void 30 inches or more high and 18 inches or more wide, in a wall or partition, through which employees can fall to a lower level.

## **Personal fall arrest system**

A system including but not limited to an anchorage, connectors, and a body harness used to arrest an employee in a fall from a working level. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

**Positioning device system**

A body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning backwards.

**Rope grab**

A deceleration device that travels on a lifeline and automatically, by friction, engages the lifeline and locks to arrest a fall.

**Safety-monitoring system**

A safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

**Self-retracting lifeline/lanyards**

A deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under minimal tension during normal employee movement and which, after onset of a fall, automatically locks the drum and arrests the fall.

**Snaphook**

A connector consisting of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released automatically closes to retain the object.

**Steep roof**

A roof having a slope greater than 4 in 12 pitch (vertical to horizontal).

**Toeboard**

A low protective barrier that prevents material and equipment from falling to lower levels and which protect personnel from falling.

**Unprotected sides and edges**

Any side or edge (except at entrances to points of access) of a walking/working surface (e.g., floor, roof, ramp, or runway) where there is no wall or guardrail system at least 39 inches high.

**Walking/working surface**

Any surface, whether horizontal or vertical, on which an employee walks or works, including but not limited to floors, roofs, ramps, bridges, runways, formwork, and concrete reinforcing steel. Does not include ladders, vehicles, or trailers on which employees must be located to perform their work duties.

**Warning line system**

A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge and which designates an area in which roofing work may take place without the use of guardrail or safety net systems to protect employees in the area.