

## **Chapter 5: Falls**

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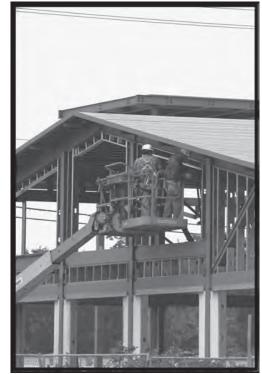
### **AERIAL LIFTS**

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Falls from elevations can result in serious injuries or even death. Aerial platforms are designed and built with safety features to help minimize the potential for worker injuries. These features include handrails, mid-rails, and toe-boards to help prevent falls and injuries from falling materials. To help ensure safety when using aerial lifts, follow these procedures:

- Test lift controls each day prior to use to determine that such controls are in safe working condition.
- When riding on aerial lifts, stand firmly on the floor of the basket. Do not climb on the edge of the basket or use planks, ladders, or other devices for a work position.
- Use a full body harness with a lanyard attached to the boom or basket to prevent the worker from being ejected or pulled from the basket.
- Maintain a minimum clearance of at least 10 feet away the nearest overhead power lines. High voltage lines require more distance.
- Do not exceed the load limits of the equipment. Allow for the combined weight of the worker, tools, and materials.
- Never move the equipment with workers in an elevated platform unless the manufacturer permits it.



• Never use an aerial lift unless you have been properly trained in its use.



### FALL ARREST

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Personal fall arrest systems (PFAS) minimize injury in case there is a fall. PFAS consist of an anchorage, connectors, body harness and may include a deceleration device, lifeline, or suitable combinations.

- A PFAS, when stopping a fall must limit maximum arresting force on an employee to 1,800 lbs.
- A PFAS must be rigged such that an employee can neither free fall more than six feet nor contact any lower level.
- PFSAS must bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet.
- PFAS must limit maximum weight of an individual with tools to 310 pounds.
- Use PFAS only if you're authorized and trained to do so.
- Inspect PFAS prior to each use for wear, damage, and other deterioration. Remove defective PFAS from service.



- To minimize fall distance, tie off at or above the "D" ring height, wherever possible.
- Ensure that all employees are trained prior to using a PFAS.



### FALL PREVENTION

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Nearly 6.5 million people work at approximately 252,000 construction sites across the nation on any given day. The fatal injury rate for the construction industry is higher than the national average for all industries. Studies show that using guardrails, fall arrest systems, safety nets, covers and restraint systems can prevent many deaths and injuries from falls. Take these steps to help reduce falls in your workplace:

- Select fall protection systems appropriate for given situations.
- Construct and/or install all fall protection systems in accordance with manufacture guidelines.
- Supervise employees properly.
- Use safe work procedures.
- Train workers in the proper selection, use, and maintenance of fall protection systems.
- Evaluate the effectiveness of all steps.
- Control fall exposures.
- Review the pre task plan or job hazard analysis with employees for work requiring fall prevention.





### FALL RETRIEVAL/RESCUE

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

It's imperative to immediately rescue workers who have fallen while wearing Personal Fall Arrest Systems. Some studies have indicated permanent damage occurs to the lower extremities when the worker hangs for more than twenty minutes. Other studies indicate that hanging in a harness for more than a half-hour can be fatal. In the event of a rescue operation, follow these procedures to help ensure a safe rescue:

- Be sure to have a rescue plan in place in case a fall occurs on the worksite.
- Promptly rescue employees in the event of a fall.
- Communicate with the subject, establish the level of consciousness, and evaluate injuries. Comfort and monitor the fall victim continually.
- Encourage the victim to try to move their legs in the harness and try to push against any footholds
- Evaluate the scene to determine how to safely gain access, whether via ladders, man-lifts or hoists or call rescue personnel as necessary.



- Ensure that all rescuer personnel wear Personal Fall Arrest System (PFAS) if exposed to heights of six feet or more.
- Communicate with your local fire department so they are aware of your activities and can respond accordingly.



### LOCATION OF FALLS—FATAL

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Falls are the leading cause of fatalities in the construction industry. Construction workers, especially in roofing and framing, are exposed to falls from rooftops, skylights, scaffolding, upper-level floor openings and ladders. Recent statistics show an average of 362 fatal falls have occurred each year, with the trend on the increase. These falls include:

- 37% from roofs.
- 20% from scaffolds
- 15% from ladders.
- 9% from structural steel.
- 4% from floors, loading docks and ground level.
- 3% from non-moving vehicles.



To protect yourself from falls, watch your step, wear non-skid footwear, and always use available fall protection systems.



### LOCATION OF FALLS—NON-FATAL

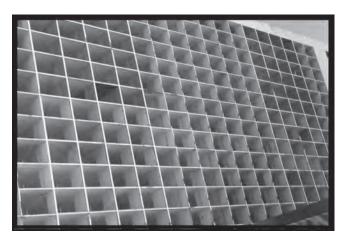
#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

The possibilities for falls are enormous in the construction industry. A number of factors are often involved in falls, including unstable working surfaces, misuse or failure to use fall protection equipment and human error. Every year, more than 100,000 are injured as a result of falls at construction sites. These falls include:

- 35% from ladders.
- 15% from scaffolds
- 12% from roofs.
- 9% from non-moving vehicles.
- 7% from stairs/steps.

Studies show that using guardrails, fall arrest systems, safety nets, covers and restraint systems can prevent many



deaths and injuries from falls. Don't be a statistic: be safe.



### PERSONAL FALL ARREST SYSTEMS: HOW TO WEAR A HARNESS

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Personal Fall Arrest Systems (PFAS) when used properly can be life-saving devices. However, careless or improper use can lead to serious injury or death. Before using any PFAS, make sure you are trained to do so and follow these safety precautions:

- Make sure the PFAS is appropriate for the job and rigged and positioned properly.
- Adjust the harness so you can reach your D-ring with your thumb.
- Allow four (flat) fingers of slack at the legs.
- Position leg straps as high as comfortably possible.
- Make sure the chest strap is across the chest/ breastbone.
- Always tie off at or above the D-ring point of the belt or harness except when using lanyards three feet or less in length. This ensures that the free fall is minimized, and that the lanyard doesn't interfere with personal movement..





### TRIGGER HEIGHTS FOR FALL PROTECTION

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

The "trigger height" is the minimum height at which fall protection is required. Trigger heights vary depending on the type of work. Know the trigger heights for your work and use fall protection as necessary.

- OSHA defines the standard trigger height for fall protection at six feet above a lower surface for construction applications, but there are exceptions in certain operations.
- The trigger height for work on scaffolds is 10 feet when fall protection is required.
- The trigger height for most steel workers is 15 feet, and 30 feet for connectors.



- The trigger height for roofers on roofs with pitches 8:12 or less in residential type, wood frame construction is 25 feet.
- "The six foot rule" is a rule of thumb that states that any worker exposed to a fall of six feet or more must be protected from falls to lower levels..
- The "100% tie-off rule" is a rule of thumb that states that any employee working six feet above a lower level must be protected from falls 100 percent of the time.



### WORKING AROUND REBAR

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Working around rebar poses hazards such as impalement, tripping, and falling. To help prevent accidents, take these precautions:

- Guard all protruding ends of steel rebar with appropriate caps to prevent impalement.
- Maintain vigilance around exposed rebar ends.
- Provide fall protection when working at any height above exposed rebar.
- When climbing or otherwise moving at heights of more than 6 feet, wear fall protection and tie off during the climb.





### HOLES/SKYLIGHTS

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Unprotected holes or openings in the floors or walls at construction sites are extremely dangerous. They need to be securely covered or guarded in order to protect against injuries resulting from falls through these openings. Serious injuries and even deaths have occurred when workers have fallen through holes,

Shaft, or other openings that were unguarded, covered by materials that were not strong enough to support the workers, or protected by improperly secured barricades or covers. To ensure safety, take these precautions.

- When there is risk of falls through holes (including skylights) that are more than six feet above lower levels, use fall protection systems (Personal Fall Arrest Systems, covers, or guardrails systems).
- Cover all floor holes so they will effectively support two times the weight of employees, equipment, and materials that may be imposed on the cover at any one time, and secure them in place.



- Make sure covers are secured.
- Mark all covers with high visibility paint and the word "HOLE."
- Guard skylights by a fixed standard railing or protect with a cover capable of supporting a 200 lb. person.
- Install toe-boards around the edges of permanent floor openings (where persons may pass below the opening).



### **OPEN SIDED FLOORS**

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Falls are the leading cause of deaths in the construction industry. Most fatalities occur when employees fall from open-sided floors and through floor openings. When working at heights, take the following precautions:

- Be alert to fall hazards; areas that require vigilance include open-sided floors, hoist areas, platforms, holes, walking/working surfaces, access to ladders and stairways, and faces of formwork.
- When exposed to open edges with vertical drops of six feet or more, ensure safety by placing guardrails around the hazard area, deploying safety nets, or by using a Personal Fall Arrest System (PFAS).



- If using guardrail system, install top rails, mid-rails, and toe-boards.
- Ensure that guardrails are capable of withstanding, without failure, a force of at least 200-pounds applied within two inches of the top edge, in any outward or downward direction.
- When working at heights, stay away from edges unless your job requires it and always be protected from falling.



### **PROPER SEATING WHILE TRAVELING**

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Falls from four to six feet can cause serious lost-time accidents or even death Falls from elevation account for one third of all deaths in construction. Do not ride equipment that does not provide a seat for you.

- Always wear seatbelts or restraints for riding in cars, trucks and personnel carriers
- Do not get off of moving vehicles. Wait for the operator to stop before dismounting.
- Do not ride in the back of pickups.
- Do not ride on fork-trucks or use fork-trucks as a platform without a proper basket.
- Do not ride in buckets of loaders.





### **SCISSOR LIFTS**

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Scissor lifts, while lifting employees to heights, not considered to be a type of aerial lift, and are regulated as scaffolds. Scissor lifts can pose fall hazards when used improperly. While OSHA specifically addresses provisions for scissor lifts, fall hazards exist and require safety precautions used with any scaffold. While there are no OSHA provisions that specifically address scissor lifts, they do meet the definition of a scaffold,

- Test all operator controls before using.
- Do not exceed the manufacturer's load capacity, including the weight of tools or materials.
- Ensure that all workers are trained in the hazards and safe operation of the scissor lift.
- Ensure that workers inside the scissor lift are protected from falls by guardrails and keep their feet on the floor.
- Before moving with workers inside the scissor lift, ensure that the surface on which the lift is being moved is within three degrees of level and free of pits, holes, and obstructions (such as overhead electrical hazards).



• Limit travel speeds according to workplace conditions, such as holes in the deck or un-level surfaces.



### **SLIPS/TRIPS**

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Each year slips and falls injure too many construction workers. Slipping on the floor is bad enough, but falling from a height can be disastrous. Workers can eliminate many slipping and tripping hazards by following the principles of good housekeeping. Take these steps to help keep your workspace "fall proof":

- Clean up all spills immediately.
- Remove clutter from stairs and walkways.
- Cover or elevate cables that cross walkways.
- Repair uneven, defective flooring, or worn stairs.
- Maintain proper lighting.
- Keep trash and loose objects picked up and dispose of them regularly.
- Store all tools and materials in their place.
- Keep ramps slip resistant with special anti-slip paint or other slip resistant material.
- Avoid carrying materials that will block visibility.





### **STAIRWAYS**

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Slips, trips, and falls on temporary stairways are a major source of injuries and fatalities among construction workers. Since falls from upper levels account for such a high percentage of construction accidents, it's important to build railings and guard rails in conjunction with the building progress. Follow these general guidelines when building/ using temporary stairways:

- Provide stairways on worksites when there is a break in elevation of 19 inches or more and no ramp, runway, embankment, or personnel hoist is available.
- Install stairways at least 30 degrees and no more than 50 degrees - from the horizontal.



- Install handrails on stairways with four or more risers or rising more than 30 inches in height – whichever is less – along each unprotected side or edge of the stairway.
- Do not use stair pans for access until poured or filled in and guardrails and handrails have been installed.
- Keep stairways free of debris and/or projections that may cause injury or snag clothing.
- Fix slippery conditions before using stairs.
- Watch for tripping hazards at the top and bottom of stairs.



### WORKING ON ROOFS

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Work on roofs is one of the most common exposures to fall hazards experienced in the construction industry. Workers may encounter fall hazards during roof access and near roof edges. Roofers may also risk falls near skylights, roof hatches, and other openings. When working on roofs, provide fall protection as a backup system in the event a worker slips, trips, or falls.

• When there is risk of falls from lowsloped roofs with unprotected sides and edges six feet or more above lower levels, use fall protection such as guardrail systems, safety net systems, personal fall arrest systems or a combination of a warning line system and guardrail system, warning line system and safety net system, warning line system and personal fall arrest system, or warning line system and safety monitoring system.



- When there is risk of falls from steep roofs with unprotected sides and edges six feet or more above lower levels, use either guardrail systems with toe-boards, a safety net system, or a personal fall arrest system.
- Cover roof openings securely or surround with a guardrail.
- Use ladders correctly. Set up your ladder on a level surface at an angle consistent with the manufacturer's specifications. Extend the ladder 3 feet above the working surface, and tie the top securely to the roof. Always inspect the ladder before climbing it, and use another if it's damaged.
- Do not store materials and equipment near a roof edge unless guardrails are erected at the edge.
- When storing materials make sure the materials are stable and self-supporting.
- Watch for slipping and tripping hazards, such as slippery or wet areas or lose tools and equipment.



### ACCESSING EQUIPMENT

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Falls from equipment, are a leading cause of injuries in construction. When accessing equipment, take these precautions to help prevent slips, trips, and falls:

- Maintain 3-point contact at all times (two hands and a foot or two feet and a hand) while mounting and dismounting equipment
- Keep steps and grab rails or hand holds clean and in good condition.
- Wear appropriate footwear. Keep shoes free of mud or other materials that could pose slipping hazards.



- Make sure you have a firm grip.
- Avoid carrying any materials while mounting or dismounting
- Always look in the direction you're traveling.
- Face the machine when you are mounting or dismounting.
- Avoid mounting or dismounting equipment while it is in motion.
- No Jumping.



### **INSPECTING FALL PROTECTION SYSTEMS**

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Regular and proper inspection of components of Personal Fall Arrest Systems (PFAS) is mandatory. When inspecting a PFAS, consider the following:

- Inspect PFAS before each use for wear, damage, and other deterioration, and remove defective components from service.
- Look for faulty connectors (D-rings, snap-hooks etc.)
- Before each use check lanyards, static lines, and body harnesses for tears, cuts, frays, or other damage, that could limit the integrity of the system.



- Make sure anchorage points are secure.
- If equipment looks as if it needs repair or it is time for maintenance tag it, "Do not use," and remove it from service.
- Keep fall protection equipment as clean as possible to facilitate inspection of the equipment.
- Store in a clean, dry place.



### LANYARDS

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Lanyards (or self-retracting lifelines) reduce the arresting forces on a worker during a fall. The standard lanyard length could vary. Follow these guidelines for safe use of lanyards:

- Inspect lanyards before each use. Remove from service any lanyard that has broken someone's fall, or is frayed or worn.
- Wear lanyards with the impact absorber/shock pack at the "D" ring.
- Make sure lanyards have the appropriate locking safety latch for the intended anchorage points.
- Do not use large climbing/rebar/ladder hooks with "beamers."
- Do not tie lanyards back to themselves. Unless the lanyard is designed for this service.
- safety h e
- Do not hook lanyards to a retractable. This can cause hook failures and affect the locking capability of the retractable. Rather, hook the retractable to the "D" ring.
- Protect lanyards from cuts and abrasions.



### PROPER TIE-OFF "ANCHORAGE" TECHNIQUES

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

A tie-off point "anchorage" is where the lanyard or static line is attached to a structural support. A proper tie-off is crucial when using a Personal Fall Arrest System (PFAS). Always follow these safety procedures:

- Always try to tie off at or above the D-ring point of your harness. This ensures that the free fall is minimized, and that the lanyard doesn't interfere with personal movement.
- Only tie off at approved anchorage points.
- Before connecting to the anchor point, inspect it for damage. Look for excessive wear or deformity that could weaken the anchor point, cracks, or sharp edges.
- Make sure the anchorage point is secure.
- Tie off in a manner that ensures you will not hit a lower level. To do this, add the height of the worker, the lanyard length, and an elongation factor of 3.5 feet. Using this formula, a six-foot tall worker requires a tie-



off point at least 15.5 feet above the next lower level. Shock absorbers built into the system can reduce this level to level distance. Keep in mind that certain tie-offs can reduce the static line or lanyard strength.

• Avoid such tie-offs. Never use knots or tie off around sharp edges.



### SAFETY HARNESSES

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

A safety harness is part of a Personal Fall Arrest System (PFAS) and is one option of protection that OSHA requires for workers on construction sites who are exposed to vertical drops of six feet or more. When worn correctly, a harness can save your worker's life. A full-body harness is the most fundamental component of a PFAS. Follow these guidelines for safe use of harnesses:

- Wear a safety harness and proper lanyard attached to an adequate anchoring point when working at heights of six feet or more.
- Inspect your body harnesses and lanyards before each use. If the harness is defective or has been exposed to an impact, take it out of service immediately.
- Make sure the harness fits and is properly adjusted. A harness should be snug but comfortable, and should not bind the wearer.
- Do not modify a harness.
- Do not use body belts as part of a personal fall arrest system because they impose a danger of internal injuries when stopping a fall.



- Do not use a body harness to hoist materials.
- Do not put on a harness unless you have been properly trained in its use and how to wear it properly.



### PROPER USE OF NETS FOR FALL PROTECTION

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

Safety nets are often used when there is a likelihood that a fall will occur. There is no margin for error when using safety nets. They must be of an approved type and used in accordance with the manufacturer's recommendations. To ensure safety, take these precautions when using safety nets:

- Use safety nets when workplaces are more than 25 feet above the ground or water surface, or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or fall protection systems are impractical.
- Make sure safety nets extend at least eight feet beyond the edge of the work surface where employees are exposed.



- Install nets as close under the work surface as practical but in no case more than 25 feet below the work surface.
- Hang nets with enough clearance to prevent a falling person from hitting the surface or structure below (as determined by impact load testing). Make sure there are no obstructions between the work area and the net. Inspect each safety net daily.
- Do not allow trash or other debris to collect in nets. Remove trash immediately.



### SELECTING A PROPER ANCHOR POINT

#### INTRODUCTION

- 1. Review any accidents or "near accidents" from the past week.
- 2. Describe the hazards of the work as they relate to your project. Explain or show the SAFE way of doing the job.
- 3. Give the TOOL BOX SAFETY TALK

An anchor point is a secure point of attachment for lifelines, lanyards or deceleration devices, and which is an independent means of supporting or suspending the employee. Secure anchor points are the most critical component when employees must use fall arrest equipment. Follow these guidelines for installation and safe use of anchor points.

- Anchor points may be permanent or temporary.
- Plan for suitable anchorage points before beginning construction.
- When selecting an anchor point, analyze all hazards below and to the side of the anchor point to ensure that a falling worker does not strike or swing into any obstacles.
- Select a location, strength and design that will allow the worker enough mobility to do the job.
- To avoid fall hazards during hook up, select structures/ anchors that are easily accessible.



- Do not use guardrail systems, scaffolds, ladders, light fixtures, conduit, plumbing, duct work, roof stacks or another lanyard as anchor points.
- Never use piping, conduit, sprinkler systems, etc. as an anchor point. Always use a structual member as an anchor point.

