

## Construction Safety & Health

# Falls

Falls are the ***most common*** cause of death for construction workers, as they account for more than 33 percent of all construction deaths.

### **THERE ARE LAWS THAT PROTECT WORKERS**

The Occupational Safety and Health Administration (OSHA) sets rules for workers to protect them from dangerous falls. These rules are called standards, and employers, by law, are required to follow all standards to protect their workers. If the standards are not followed, OSHA can make your employer fix the hazard and will also fine your employer. OSHA has standards that are specifically for construction workers and they have standards that apply to other “general industry” workers.

### **How Can We Protect Ourselves From Falls?**

When workers on a construction site are exposed to vertical drops of 6 feet or more, OSHA requires that employers provide fall protection, generally in one of these three ways before work begins:

- placing guardrails around the hazard area;
- deploying safety nets;
- providing a personal fall arrest system for each employee.

**OSHA requires that employers provide these protections to workers when they are needed. OSHA requires employers to:**

- Develop a written fall protection plan;
- Identify potential fall hazards prior to each project and during daily walk-around inspections;
- Ensure that your fall protection equipment is right for the work you are doing, that it is in good condition, and that it is used properly;
- Conduct regular trainings on fall hazards and on the required personal protective equipment.

### **Guardrails And Safety Net Systems**

Guardrail and safety net systems are two ways to protect workers from falls on the job. If workers are more than 6 feet above the lower surface, some type of fall protection must be used by the employer.

**If the employer uses guardrails, s/he must be sure that:**

- toprails are at least ¼ inch thick to prevent cuts and lacerations; and they must be between 39 and 45 inches from the working surface;
- if wire rope is used, it must be flagged at least every six feet with highly visible materials;
- midrails, screens or mesh are installed when there are no walls at least 21 inches high. Screens and mesh must extend from the toprail to the working level.
- there are no openings more than 19 inches;
- the toprail can withstand at least 200 lbs. of force; the midrail can withstand 150 lbs. of force;

the system is smooth enough to protect workers from cuts and getting their clothes snagged by the rail; and

- if guardrails are used around holes at points of access, like a ladderway, a gate must be used to prevent someone from falling through the hole, or be so offset that a person cannot walk directly into the hole.

**If an employer uses safety nets, s/he must be sure that:**

- the nets must be as close as practicable under the working surface, but never more than 30 feet below;
- they must inspect the safety net every week for damage;
- each net has a border rope with a minimum strength of 5,000 lbs.;
- the safety net extends outward a sufficient distance, depending on how far the net is from the working surface (OSHA has a formula to follow);
- the safety net can absorb the force of a 400-pound bag of sand dropping on to the net (“the drop test”);
- items in the net that could be dangerous are removed as soon as possible.

## Personal Fall Arrest Systems

Personal fall arrest systems are one way to protect workers from falls. In general, workers must have fall protection when they could fall 6 feet or more while they are working.

OSHA **requires** workers to wear a full-body harness, (one part of a *Personal Fall Arrest System*) when they are working on a *suspended scaffold* more than *10 feet* above the working surface, or when they are working in *bucket truck or aerial lift*. Employers may also choose to use a Personal Fall Arrest System, instead of a guardrail, when workers are working on a *supported scaffold* more than 10 feet above the working surface.

**There are three major components of a Personal Fall Arrest System (PFAS):**

- the anchor and the anchorage connector;
- the connecting device, which is a lanyard or a retractable lifeline, with snaphooks;
- the full-body harness.

Before you begin work using your Personal Fall Arrest System, you must be sure that all parts of your system are in working order. Complete the exercise below to better understand the steps you need to take to protect yourself from a dangerous fall.

## A Checklist For Your Personal Fall Arrest System

1. A Personal Fall Arrest System is made up of an anchorage, connecting device, and a full-body harness. The connecting device may be a lanyard with snaphooks, or a self-retracting lifeline. A lanyard could also include a deceleration device. Make sure that you are using components from the same manufacturer to ensure that the system works as it should. Mixing and matching components from different manufacturer’s systems isn’t a good idea.
2. Body belts can not be used for fall arresting service. However, a body belt is allowed as part of a *positioning system*. A positioning system is one way to prevent falls from occurring. It involves equipment for keeping your body in a position where you are not able to fall. For all situations where you could actually fall, you need to wear a full-body harness.
3. Your personal fall arrest system must be inspected for damage before each time you wear it. If there are defects, or if someone has taken a fall using the equipment, it must be removed from service.
4. The attachment location of the body harness must be in the center of the wearer’s back, near the shoulder level or above the head.
5. Vertical lifelines or lanyards must have a minimum breaking strength of 5,000 lbs, and be protected against being cut or abraded.
6. Each employee must be attached to a separate vertical lifeline. (There is a special exception when constructing elevator shafts.)
7. The webbing, which is the materials used for ropes and straps of lifelines, lanyard and harnesses, must be made of synthetic fibers.
8. An anchorage for workers’ personal fall arrest equipment must be independent of any anchorage used to support or suspend platforms, and it must be able to support at least 5,000 lbs. per employee attached to it.
9. Connectors must be made from steel or equivalent materials, they must have a corrosion-resistant finish, and the edges must be smooth.
10. D-rings and snaphooks must have a minimum tensile strength of 5,000 lbs.
11. Snaphooks must also be a locking-type, (they are generally double-locking) and designed to prevent the snaphook from opening and slipping off the connector.
12. Snaphooks can not be *directly connected* to the webbing, rope or wire, to each other, to a D-ring to which another snaphook or other connector is attached, to a horizontal lifeline, or to any other object that could cause the snaphook to open.

## Ladder Safety

Every year, about 50 workers are killed by falls from ladders. When you are working on ladders, you need to ensure your

safety...

**1. Choose the right ladder to use!** There are two types of ladders: fixed and portable. If you need to use a portable ladder, decide whether you need a self-supporting ladder (an "A" frame), or a straight ladder or extension ladder.

## **2. Always inspect the ladder first!**

- Check for any damage, like cracks, any bends, look for splits or corrosion.
- If you are working on a extension ladder check to see that there are no frays in the rope.
- Check all the rungs and the steps.
- Slip-resistant pads are needed to make sure the ladder can be properly placed on the surface.
- Make sure locks and bracers are working properly, and that all bolts are securely fastened.

## **3. Setting up and using a straight or extension ladder:**

- Use two people to carry and set up a ladder, if possible.
- The horizontal distance between the ladder and the wall should be  $\frac{1}{4}$  of the length of the ladder. For example, if a ladder is 20 feet high, it should be 5 feet from the wall (20 divided by 4 is 5). Counting the rungs will give you a good estimate of the length – rungs are about 1 foot apart.
- Don't place ladders in front of door unless the doors are blocked off, locked or guarded.
- Don't place ladders on boxes, barrels or other unstable bases.
- When using a ladder to get onto a roof, the top of the ladder must extend at least 3 feet above the roof surface.

## **When you are using the ladder:**

1. Hold on with both hands when going up or down. Always use at least one hand to hold on.
2. If material must be handled, hoist it up and lower it using a rope.
3. Always face the ladder when climbing up or down.
4. Always rest a ladder on the side rails – never on the rungs.
5. Do not climb higher than the 3rd rung from the top on straight or extension ladders.
6. Do not climb higher than the 2nd tread from the top on step ladders.
7. Do not reach your body to a point where your waist is beyond the side rails.
8. Do not use a metal ladder near electricity (be at least 10 feet away).
9. Use three-point contact at all times, always with at least one hand on the ladder. Carry only small objects, and no heavy loads.
10. Take special precautions when setting up or climbing a ladder on a windy day.

## **Scaffold Work Can Be Dangerous. Know The Basics Of Scaffold Safety.**

There are thousands of scaffold-related injuries – and about 40 scaffold related deaths – every year in the U.S. If you are doing work on scaffolds, know how to work on them safely – it could save your life!

Here are some rules about scaffolds that must be followed if you want to work safely:

1. A competent person must be available to direct workers who are constructing or moving scaffolds; s/he must also train employees, and inspect the scaffold and its components before every work shift, and after any event that could affect the structural integrity of the scaffold.

The competent person must be able to identify unsafe conditions, and be authorized by the employer to take action to correct unsafe conditions, to make the workplace safe. And you need a qualified person, someone who has very specific knowledge or training, to actually design the scaffold and its rigging.

2. Every supported scaffold and its components must support, without failure, its own weight and at least four times the intended load. The intended load is the sum of the weights of all personnel, tools and materials you will place on the scaffold. Don't load the scaffold with more weight than it can safely handle.

3. On supported scaffolds, working platforms/decks must be planked close to the guardrails. Planks are to be overlapped on a support at least 6 inches, but not more than 12 inches.

4. Inspection of supported scaffolds must include:

Check metal components for bends, cracks, holes, rust, welding splatter, pits, broken welds and non-compatible parts.  
Cover and secure floor openings and label floor opening covers.

5. Each rope on a suspended scaffold must support the scaffold's weight and at least six times the intended load.

6. Scaffold platforms must be at least 18 inches wide, (there are some exceptions, and guardrails and/or personal fall arrest systems must be used for fall protection any time you are working 10 feet or more above ground level. Guardrails must be between 39 and 45 inches high, and midrails must be installed approximately halfway between the toprail and the platform surface.

7. The OSHA standard requires that a worker have fall protection when working on a scaffold 10 or more feet above the ground.

- OSHA requires the use of a guardrail OR a personal fall arrest system when working on a supported scaffold.
- OSHA requires BOTH a guardrail AND a personal fall arrest system when working on a single-point or two-point suspended scaffold.
- OSHA requires a personal fall arrest system when working on an aerial lift.

8. Your lifeline must be tied back to a structural anchorage capable of withstanding 5,000 lbs of dead weight per person tied off to it. Attaching your lifeline to a guardrail, a standpipe or other piping systems will not meet the 5,000 lbs requirement and is not a safe move.

9. Wear hard hats, and make sure you have toeboards, screens and debris nets in place to protect other people from falling objects.

10. Counterweights for suspended scaffolds must be able to resist at least four times the tipping moment, and they must be made of materials that can not be easily dislocated (no sand, no water, no rolls of roofing, etc).

(The term "tipping moment" refers to the number of foot-pounds where weight times distance of the counterweight equals, or balances, weight times distance for the loaded scaffold. Therefore, multiplying the calculated weight of the counterweight by four will ensure that the scaffold is able to resist at least "four times the tipping moment." This would be calculated by the qualified person who designs the scaffold.)

11. Your employer must provide safe access to the scaffold when a platform is more than two (2) feet above or below the point of access, or when you need to step across more than 14 inches to get on the platform. Climbing on cross braces is not allowed! Ladders, stair towers, ramps and walkways are some of the ways of providing safe access.

12. All workers must be trained on:

- how to use the scaffold, and understand how to recognize hazards associated with the type of scaffold they are working on;
- understanding the maximum intended load and capacity;
- recognizing and reporting defects;
- fall hazards, falling object hazards and any other hazards that maybe encountered, including electrical hazards (such as overhead power lines);
- having proper fall protection systems in place.

NOTE: Only some scaffolds were selected for this training. There may be additional hazards associated with other scaffolds that will not be covered in your training.

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