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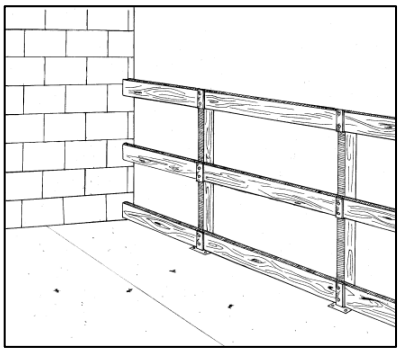
Guardrail and Safety Net Systems Summary

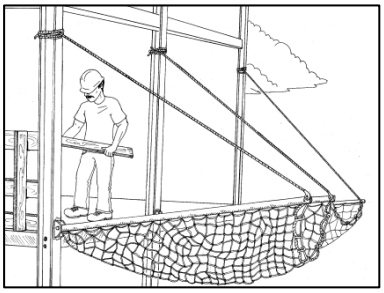
Guardrail and safety net systems are two ways to protect workers from falls on the job. If you are more than 6 feet above the lower surface, some type of fall protection must be used by your employer.

If your employer uses **guardrails:**



- Toprails must be 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 must be installed when there are no walls at least 21 inches high. Screens and mesh must extend from the toprail to the working level.
- There can be no openings more than 19 inches;
- The toprail must withstand at least 200 lbs. of force; the midrail must withstand 150 lbs. of force;
- The system must be smooth enough to protect workers from cuts and getting their clothes snagged by the rail.
- 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 offset so that a person cannot walk directly into the hole.

If your employer uses **safety nets**:



- The nets must be as close as practicable under the working surface, but never more than 30 feet below;
- The safety net must be inspected every week for damage;
- Each net must have a border rope with a minimum strength of 5,000 lbs.;
- The safety net must extend outward a sufficient distance, depending on how far the net is from the working surface (OSHA has a formula to follow);
- The safety net must 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 must be removed as soon as possible.

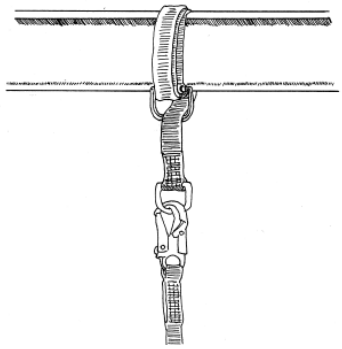
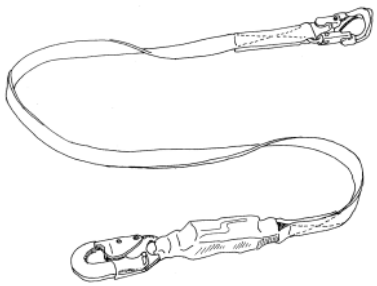
SOURCE: Construction Safety & Health Fall Hazards, Central New York COSH, 2007, OSHA grant product

Personal Fall Arrest Systems Summary

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

The following are some things to remember about personal fall arrest systems:

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 you are using components from the same manufacturer to ensure that the system works as it should. If not, any substitution or change must be evaluated or tested by a competent person to ensure that it meets the standard.

2. **Body belts cannot 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** each time before 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 your back, near the shoulder level or above your 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 worker 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 worker attached to it.

9. **Connectors** must be made from **steel or equivalent** materials, with 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 be a **locking-type** (they are generally double-locking) and designed to prevent the snaphook from opening and slipping off the connector.

12. **Snaphooks cannot 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.

Source: Construction Safety & Health Fall Hazards, Central New York COSH, 2007, OSHA grant product

Preventing Ladder Falls - *Construction Safety*

Why construction falls?

Here area few basic facts about falls in construction:
-- Every day, four construction workers die on the job.
-- Falls are the most common cause of fatal injuries to construction workers.
-- The consequences of a fall affect not only the worker, but also his or her family and community.
-- Construction falls can be prevented. Contractors and foreman can do many things to organize the worksite to be safer for their employees. But workers themselves can also make some inexpensive, simple changes to the way they work that can save their lives.
-- Ladders are one of the most common pieces of equipment on a construction site. But that doesn't mean they are safe. There are construction workers who are injured or killed falling from a height every day. Using ladders more safely is one way to start preventing falls at your work site.

Set an example at work

Your co-workers can learn a lot from you. At first, you might be the only one who is concerned with safety at your worksite. But over time, other workers will see that the foreman will give you the time you need to be safe. They will see how many little things add up to big effects on safety. And they will see how they, too, can help to make your worksite safer.

So, set an example. Don't worry about being the first—they'll thank you for it later.

How can I prevent a fall from a ladder?

There are many ways you can prevent a fall from a ladder—here are just three suggestions to get you started.

- Choose the right ladder for the job.
- Tie the top and bottom of the ladder to fixed points when necessary.
- Don't carry tools or other materials in-hand while climbing the ladder.

1. Choose the right ladder for the job.

- First you need to make sure that a ladder is the best equipment for what you need to do. Would scaffolding or a mechanical lift be better?
- Many times, the ladder is the only physical support you have while you are working. If it fails, you can fall. That's why it is so important to find the right ladder when you do need to use one. The three main types of ladders—step ladders, straight ladders, and extension ladders—are used in different situations for different tasks.
- Before you start using a ladder, ask yourself two questions.
- **Is the ladder long enough?** It should be long enough for you to set it at a stable angle and still extend at the top to give you something to hold on to when you get

on the ladder to descend. Setting the ladder at the right angle helps you keep your balance on the ladder. It also helps keep the ladder from falling backwards.
    - Make sure the ladder extends 3 feet (3 rungs; 0.9 meters) above the surface you will be working on.
    - Make sure the ladder is placed at a stable angle. For every four feet (1.2 m) high the ladder is, the base should be 1 foot (.3 m) out from the wall
    - For example, if you will be working on a 10 foot-high roof (3 m), you need a ladder that is at least 14 feet (4.25 m) long. The base should be 2 ½ feet (.75 m) from the wall.
- **Is the ladder in good working condition?** It shouldn't be missing pieces or be cracked or otherwise damaged. Check the duty rating on extension ladders – is it high enough for the weight you will be putting on it? Longer ladders don't always have higher duty ratings, so be sure to check. In construction, the most common ratings are:
    - Heavy Duty (I) supports up to 250 pounds (113 kg).
    - Extra heavy duty (IA) supports up to 300 pounds (136 kg).
    - Special duty (IAA) supports up to 375 pounds (170 kg).

2. Tie the top and bottom of the ladder to fixed points when necessary: if it doesn't extend 3' above the landing, on slippery surfaces, and where it could be displaced by work activities or traffic.

- Tie both sides of the top of the ladder to a fixed point on the roof or other high surface near where you are working. The bottom should be tied to a fixed point on the ground. Securing the ladder in this way prevents the ladder from sliding side-to-side or falling backwards and prevents the base from sliding.
- Tying the ladder off at the beginning of the day and untying it at the end will only take you about 5 minutes. It can make all the difference for your safety. If you need to move the ladder around, allow extra time for this important step, or consider using something else, such as a scaffold.

3. Don't carry tools or other materials in-hand while climbing the ladder.

- Take precautions when you are going up or down a ladder. Instead of carrying tools, boards, or other materials in your hands, use a tool belt, install a rope and pulley system, or tie a rope around your materials and pull them up once you have reached the work surface. Ask for help if you need to use more than one hand to pull them up.
- Carrying tools or anything else in your hands as you climb the ladder can throw you off balance. When you climb a ladder, always use at least one hand to grasp the ladder when going up or down.

Source: *CDC/NIOSH in partnership with CPWR-The Center for Construction Research and Training, Hollywood, Health and Society, and the Spanish-language network Telemundo.*

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. The competent person must also train workers, 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 a ***qualified person***, someone who has very specific knowledge or training, must 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 that will be placed 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. Inspections of ***supported*** scaffolds must include:
   - Checking metal components for bends, cracks, holes, rust, welding splatter, pits, broken welds and non-compatible parts.
   - Covering and securing floor openings and labeling 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. OSHA standards require that workers have **fall protection when working on a scaffold 10 or more feet above the ground**. OSHA requires the following:

● The use of a **guardrail OR** a **personal fall arrest system** when working on a ***supported scaffold***.
● **BOTH** a **guardrail AND** a **personal fall arrest system** when working on a ***single-point or two-point suspended scaffold***.
● 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 there are 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 cannot be easily dislocated (no sand, no water, no rolls of roofing, etc.). [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 how to recognize hazards associated with the type of scaffold they are working on;
- the maximum intended load and capacity;
- how to recognize and report defects;
- fall hazards, falling object hazards and any other hazards that may be encountered, including electrical hazards (such as overhead power lines); and,
- having proper fall protection systems in place.

SOURCE: Construction Safety & Health Fall Hazards, Central New York COSH, 2007, OSHA grant product