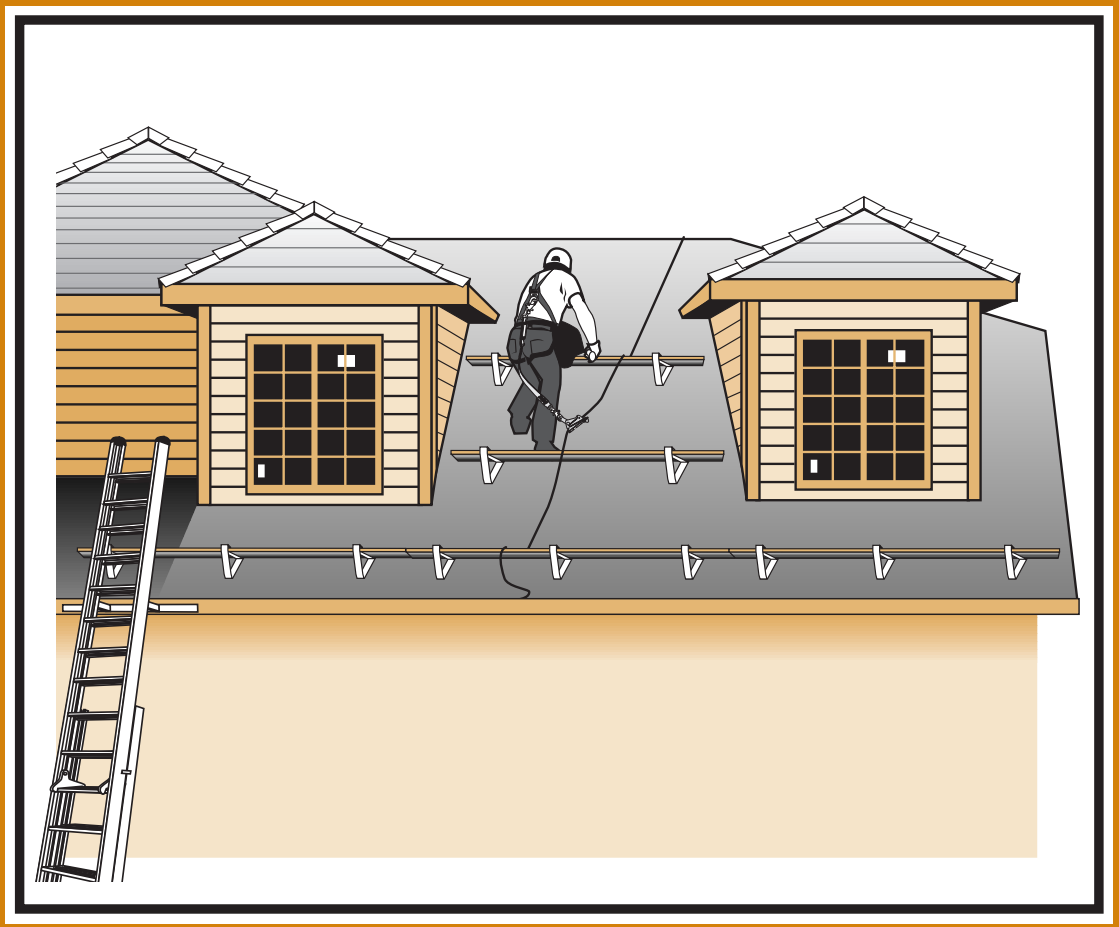
FALL PROTECTION
FOR RESIDENTIAL – TYPE CONSTRUCTION



Oregon Occupational Safety & Health Division (OR-OSHA)

DEPARTMENT OF CONSUMER & BUSINESS SERVICES

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Contents

Introduction

Fall protection is a broad concept. It describes behaviors, systems, processes, procedures, equipment, and rules intended to protect workers from fall hazards. Fall protection doesn't mean bulky or cumbersome equipment. It doesn't interfere with work tasks and it doesn't get in the way of co-workers — if you understand the concept and apply it appropriately. *This guide will help you understand the fall-protection concept and apply it to residential-type construction work.*

Residential-type construction applies to construction work where the working environment, construction materials, methods, and procedures are similar to those of typical single-family or townhouse construction.

Thanks to the efforts of equipment vendors, engineers, and safety professionals, there are many effective ways to protect residential-type construction workers from fall hazards. New methods, techniques, and products are constantly evolving. However, none of these efforts prevents injuries unless employers provide appropriate equipment and train workers how, when, and where to use it effectively.

I. Fall-protection requirements for residential-type construction

OR-OSHA's fall-protection requirements for the construction industry are included in OAR 437, Division 3, Subdivision M, of the Oregon construction safety and health standard. The requirements apply to virtually all *walking and working surfaces* in construction workplaces.

Division 3, Subdivision M

Division 3, Subdivision M specifies:

- Where fall protection is required
- Appropriate fall-protection systems and methods
- Proper fall-protection construction and installation practices
- Supervision requirements for workers who use fall protection
- Safe work procedures for workers who use fall-protection systems
- Training requirements for workers who use fall-protection systems

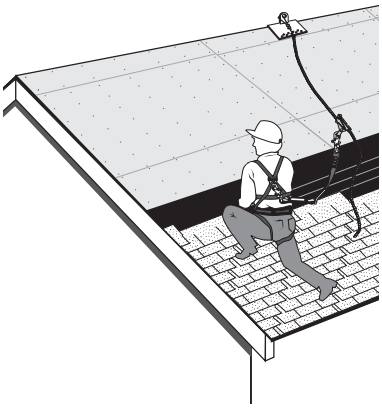
Workers doing residential-type construction must follow Division 3, Subdivision M requirements. OR-OSHA permits those doing residential-type construction to work up to 10 feet above a lower level without fall protection for tasks such as leading-edge and top-plate work, setting walls and trusses, or roofing and sheathing. Above 10 feet, workers must use guardrails, safety nets, or personal fall-arrest systems for protection.

Workers doing residential-type construction can work up to 10 feet above a lower level without fall protection.

Workers doing roofing and sheathing work on residential-type structures can use *2" x 6" roof brackets and slide guards* for protection under the following conditions:

- Roofs sloped 3:12 through 6:12 must have a ground-to-eave height not exceeding 25 feet.
- Roofs sloped greater than 6:12 through 8:12 must have a ground-to-eave height not exceeding 25 feet. The roof brackets and slide guards must be used in multiples, spaced no more than every eight feet vertically. *All roof brackets and slide guards must bear on solid surfaces.*
- The roof bracket and slide guard at the *lower edge* of the slope must be at least six inches from the roof edge and perpendicular to the roof surface. Other brackets and slide guards above the lower edge may be installed at a 60-degree angle to the roof surface. *All roof brackets and slide guards must bear on solid surfaces.*

II. Protecting workers from falling: systems and methods



A personal fall-arrest system consists of an anchor, connectors, and a body harness.

The three basic, or *conventional*, types of fall protection are *personal fall-arrest systems*, *safety-net systems*, and *guardrail systems*. This section describes personal fall-arrest systems and other fall-protection methods appropriate for residential-type construction. Safety-net systems are not practical as fall protection for most residential-type structures.

The personal fall-arrest system

A personal fall-arrest system consists of an *anchor*, *connectors*, and a *body harness* that work together to stop a fall and to minimize the arrest force. Other system components may include a *lanyard*, a *deceleration device*, and a *lifeline*. However, the personal fall-arrest system is effective only if you know how all of the components work together to arrest a fall.

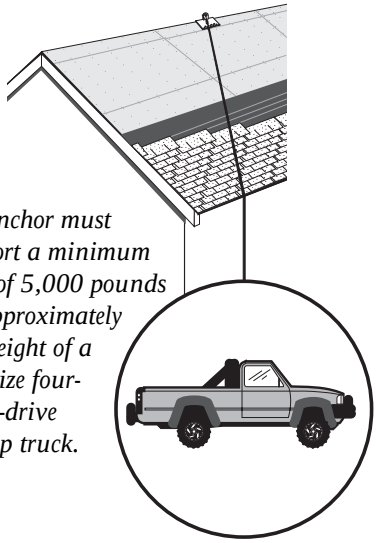
Personal fall-arrest system components

The anchor

The anchor, perhaps the most important personal fall-arrest system component, must be able to support a minimum load of 5,000 pounds. However, finding an anchor on a wood-frame structure that will meet that requirement is not easy. A mid-size four-wheel-drive pickup weighs about 5,000 pounds; imagine hanging a pickup on an anchor that you might use with a personal fall-arrest system. Would you trust that anchor to hold? If you are not sure how much weight an anchor can hold, you can have a *qualified person* design a complete fall-protection system. The system must also be installed under the supervision of the qualified person and it must maintain a *safety factor* of at least two — two times the impact force of a worker free falling six feet. OR-OSHA defines a qualified person as "one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to resolve problems relating to a specific subject, operation, or project."

Qualified person

Safety factor



An anchor must support a minimum load of 5,000 pounds — approximately the weight of a mid-size four-wheel-drive pickup truck.

Never use hoists or guardrails as anchors. They are not built to withstand the impact forces generated by a fall.

Connectors

Connectors couple the components of a personal fall-arrest system together. *D-rings* and *snap hooks* are the most common types of connectors. Connectors must be drop-forged, pressed, made from formed steel or made from equally strong material. They must be corrosion-resistant, with smooth surfaces and edges that won't damage other parts of the personal fall-arrest system.

The D-ring, a body-harness component, attaches to a deceleration device or a lanyard. D-rings must have a minimum breaking strength of 5,000 pounds.

The snap hook consists of a hook-shaped member and a keeper. It opens to receive a connecting component and when released, automatically closes. Snap hooks must also have a minimum breaking strength of 5,000 pounds.

There are two types of snap hooks, locking and non-locking. The locking type has a self-locking keeper that won't open until it's unlocked. OR-OSHA has determined the non-locking type is not safe. **Use only locking snap hooks as part of a personal fall-arrest system.**

Non-locking snap hooks are prohibited as part of a personal fall-arrest system.

Be especially careful when you connect snap hooks. Some connections can cause snap hooks to disengage or "roll out." Avoid the following:

- Connecting a snap hook directly to a horizontal lifeline
- Connecting two or more snap hooks to one D-ring
- Connecting two snap hooks together
- Connecting a snap hook to a webbing loop or a webbing lanyard
- Connecting a snap hook to D-rings or other connectors that are not compatible with the dimensions of the snap hook. "Compatible" means that no matter how the D-ring is positioned with the snap hook attached, the D-ring cannot open the keeper.

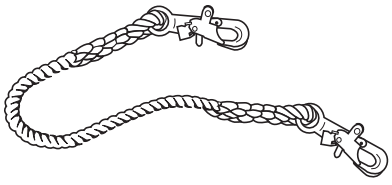
The body harness

The body harness consists of straps that distribute fall-arrest forces over the thighs, waist, chest, shoulders, and pelvis. Body harnesses come in many styles, most of which are light and comfortable; a basic harness should include a back D-ring for attaching lifelines, lanyards, or retractable devices and a back pad for support. A body harness must exert an arresting force of no more that 1,800 pounds on a falling worker.

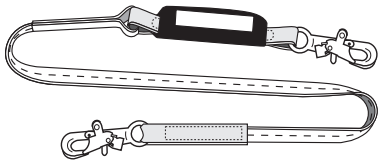
Remember the following when you use a body harness:

- Body harnesses cannot be made from natural fibers.
- Body harnesses are available in different sizes. Make sure the harness fits properly.
- The attachment point of a body harness must be located in the center of the back, about shoulder level.
- Use only body harnesses approved for commercial work. Do not use recreational climbing harnesses.

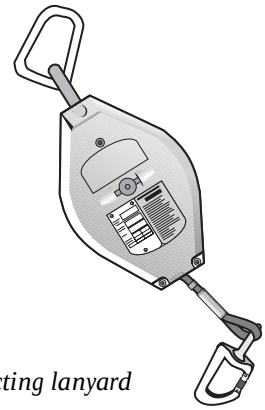
Types of lanyards



Rope lanyard



Shock-absorbing lanyard



Self-retracting lanyard

Lanyards

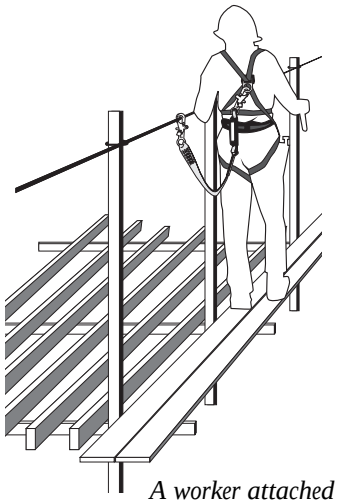
A lanyard is a specially designed rope, strap, or webbing that connects a body harness to an anchor, a deceleration device, or a lifeline. Lanyards must have a minimum breaking strength of 5,000 pounds; they come in a variety of designs including self-retracting types that make moving easier and shock-absorbing types that reduce fall-arrest forces.

Remember the following when you use a lanyard:

- Self-retracting lanyards that limit free-fall distance to two feet or less must have components that will hold a minimum load of 3,000 pounds with the lanyard in the fully extended position.
- Self-retracting lanyards that do not limit free-fall distance to two feet or less must have components that will hold a minimum load of 5,000 pounds with the lanyard in the fully extended position.
- When using self-retracting lanyards that do not limit free-fall distance to two feet or less, work near or directly below the anchor to avoid *swing falls*. (See Page 9 for more information on swing falls.)
- Do not use rope lanyards made from natural fibers.

Deceleration devices

You can reduce fall-impact forces on an anchor (and yourself) by minimizing the fall distance and using a deceleration device, such as a shock-absorbing lanyard or self-retracting lifeline. A third type of deceleration device is the *rope grab*, a mechanism that allows you to move up and down a vertical lifeline. The rope grab automatically locks onto the lifeline if you fall. **Always follow manufacturers' instructions when you use deceleration devices.**



A worker attached to a horizontal lifeline with a shock-absorbing lanyard.

Lifelines

A lifeline is flexible cable or rope that connects to a body harness, lanyard, or deceleration device and to at least one anchor. There are two types of lifelines, *vertical* and *horizontal*.

A vertical lifeline attaches directly to a body harness, lanyard, or deceleration device at one end and to an anchor at the other end (and hangs vertically, hence the name). Vertical lifelines must have a minimum breaking strength of 5,000 pounds.

The *self-retracting lifeline* is both a vertical lifeline and a deceleration device. It consists of a drum-wound line that unwinds and retracts from the drum as a worker moves. If the worker falls, the drum automatically locks. Self-retracting lifelines that automatically limit free-fall distance to two feet or less must have a minimum breaking strength of 3,000 pounds.

Self-retracting lifelines that do not limit free-fall distance to two feet or less must have a minimum breaking strength of 5,000 pounds.

If you need to move horizontally over an extended distance, the vertical lifeline can be hazardous because it creates the potential for a swing fall — a pendulum motion that results when you swing back under the anchor point. (See Page 9 for more information on swing falls.)

Unlike the vertical lifeline, the horizontal lifeline stretches between two anchors. When you connect to the line with a body harness, lanyard, or deceleration device, you can move freely across a flat surface.

Horizontal lifelines and their anchors are subject to much greater loads than vertical lifelines. If not anchored correctly, horizontal lifelines can fail at the anchor points. For these reasons, horizontal lifelines must 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 (twice the potential impact force of a worker free falling six feet). For more information, see *Understand horizontal lifeline forces*, Page 8.

Keep in mind that vertical lifelines must support at least 5,000 pounds and horizontal lifelines must support at least 5,000 pounds per attached worker. Protect all lifelines against cuts or abrasions and never use lifelines made from natural fiber rope; the fibers deteriorate.

Competent person

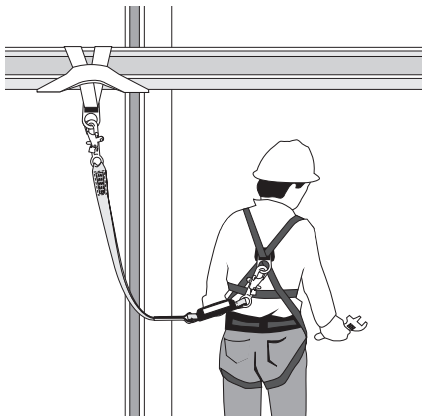
After a fall-arrest system stops a fall, remove it from service immediately and do not use it until a *competent person* determines that it's safe. OR-OSHA defines a competent person as "one who is capable of identifying existing and predictable hazards in the work environment and who has authorization to take prompt measures to eliminate the hazards."

Tying off

"Tying off" means connecting to an anchor; it establishes the most important link in a personal fall-arrest system. Remember the following points — they're critical to tying off safely.

Plan anchor points. Try to anticipate anchor locations before construction work begins. It's possible to design anchors into a building for window cleaning or other maintenance tasks, for example. Properly planned anchors can be used by workers during the construction phase, as well. A qualified person must design anchor systems installed during construction.

Avoid knots in rope lanyards and lifelines. Knots can reduce the strength of a lifeline or a lanyard by 50 percent or more. Also avoid using knots for tying off to an anchor; use a locking snaphook designed for that purpose.



A worker using a tie-off adaptor and a shock-absorbing lanyard.

Avoid tying off around an I-beam. By tying off a rope lanyard or lifeline around an I-beam, you reduce the rope's strength by 70 percent due to the cutting action of the beam edges.

Avoid tie-offs around I-beams and any other rough or sharp objects. Use *tie-off adapters* or *beam connectors* to anchor a lifeline or lanyard to the beam.

Tie-off adapters and beam connectors

Understand horizontal lifeline forces. Tie-off and anchor points are even more critical on horizontal lifelines than on vertical lifelines. The reason is related to the geometry of the horizontal lifeline (anchored at each end) and its *sag angle*, which is the line's angle of deflection when subjected to a load. Reducing the sag angle on a horizontal lifeline increases the forces imposed on the line during a worker fall. For example, a horizontal lifeline with a 15-degree sag angle will receive twice the impact force as a horizontal lifeline with a 30-degree sag angle. If you decrease the sag angle to five degrees, the impact force increases by a factor of six. Although two workers can tie off to the same horizontal lifeline, if one worker falls, the line movement could cause the other worker to fall too, subjecting the line and anchors to even greater impact forces. For these reasons, horizontal lifelines must be designed, engineered, and installed under the supervision of a qualified person.

Sag angle

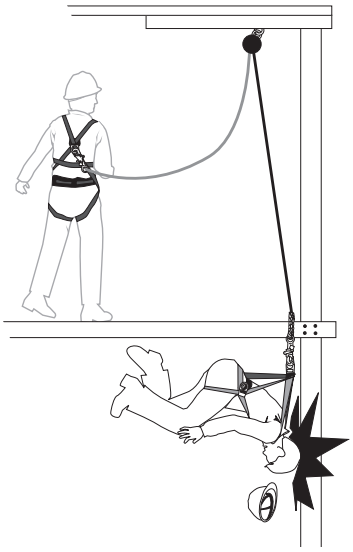
Be cautious with eyebolt connections. The strength of an eyebolt is rated along the axis of the bolt, and it's greatly reduced when force is applied at an angle to the axis. Avoid connections to eyebolts that might cause such an effect during a fall.

Free-fall distance limited to six feet.

Consider total fall distance with tie-off height. Personal fall-arrest systems are designed to stop workers who experience *free falls*. Free fall is the part of the fall before the arrest system starts to take effect. However, even after the system activates, a worker will continue to fall. The distance a worker falls includes the free-fall distance, the lifeline stretch from the force of the fall, and — if the worker uses a deceleration device — the distance involved in absorbing shock. OR-OSHA limits free falls to six feet (less if a worker could strike an object or lower level). Lifeline stretch and *deceleration distance* cannot exceed 3.5 feet. Therefore, a worker wearing a personal fall-arrest system could fall up to 9.5 feet before stopping (six feet plus 3.5 feet). OR-OSHA requires that personal fall-arrest systems be rigged so that workers don't free fall more than six feet or strike a lower level.

Swing falls

If you use a personal fall-arrest system and are not working directly below the tie-off anchor, you will swing back under the anchor during a fall. Swing falls are especially hazardous because you can hit an object or a lower level during the pendulum motion. Think about the potential for a swing fall whenever you connect a lifeline to a personal fall-arrest system. In a recent case, a worker attached a retractable lifeline to a third-floor column and moved away from the column. He fell, swinging first onto a lower floor and then striking a lower column. He had extended the lifeline out more than 16 feet and was only eight feet from the ground when he finally stopped swinging.



Swing falls can actually increase fall distance.

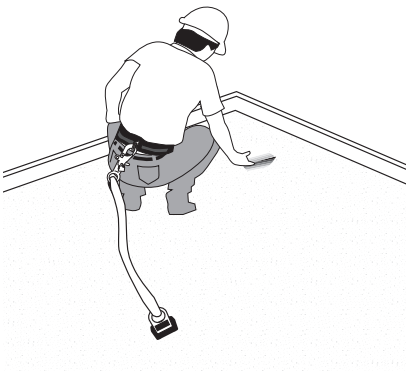
Remember the following about swing falls:

- Fall distance can actually increase during a swing fall.
- The impact force from a swing fall can be the same as it would be for a vertical fall with the same change of elevation.
- During a swing fall, you can strike an object or lower level before the arrest system stops your fall.

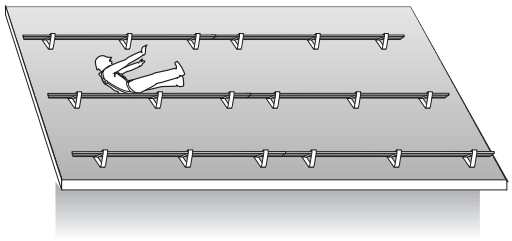
Fall restraint

A fall-restraint system has the same components as a personal fall-arrest system — an anchor, connectors, and a body harness. The difference between the two systems is that *a fall-restraint system keeps a worker from falling*. A fall-restraint system must connect to an anchor that can support at least 5,000 pounds, or it must be designed, installed, and used under the supervision of a qualified person.

It's almost impossible to design a fall-restraint system for sheeting or other leading-edge work. You would have to frequently adjust your connecting line to work and still remain in restraint. Use a fall-restraint system for fall protection when you're nailing decks or framing along unprotected edges.



A fall-restraint system.



Roof brackets and slide guards: Use 16-penny nails to attach roof brackets with full bearing on a solid surface. To properly support the 2" x 6" slide guard, never space brackets more than eight feet apart horizontally. The 2" x 6" slide guard must stop a worker from falling over the edge or sliding off the roof.

Other fall-protection methods

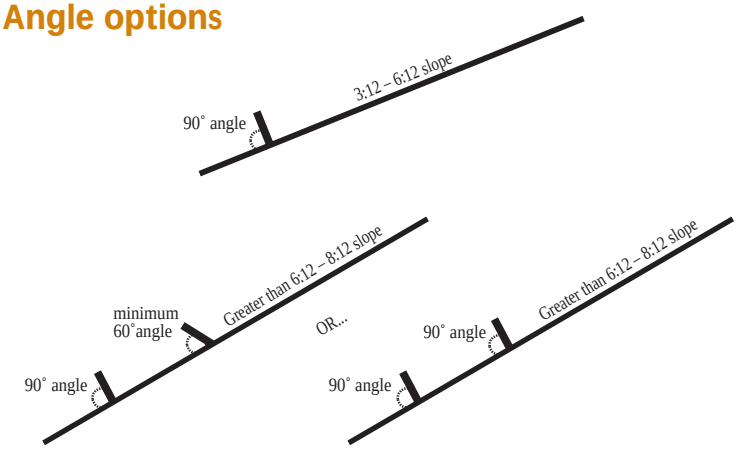
Other types of fall protection used in residential-type construction include roof brackets and slide guards, guardrails, warning lines, controlled access zones, covers, fences and barricades, and safety monitoring systems. Each is described below.

Roof brackets and slide guards

Roofers who install sheathing and related materials frequently use roof brackets and slide guards as fall protection. OR-OSHA permits workers to use 2" x 6" roof brackets and slide guards for fall protection on residential-type structures under the following conditions:

- On roofs sloped 3:12 through 6:12, the ground-to-eave height must not exceed 25 feet.
- On roofs sloped greater than 6:12 and less than or equal to 8:12, the ground-to-eave height must not exceed 25 feet and the roof brackets and slide guards must be used in multiples, spaced no more than every eight feet vertically. *All roof brackets and slide guards must bear on solid surfaces.*

Angle options

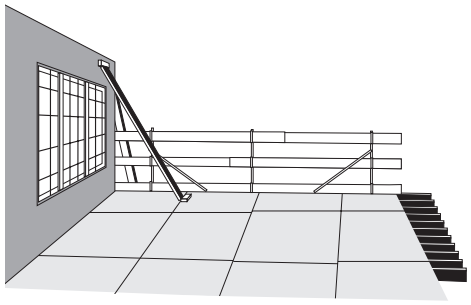


Appropriate angles for roof brackets and slide guards

- The roof bracket and slide guard at the *lower edge* of the slope must be at least six inches from the roof edge and perpendicular to the roof surface. Other brackets and slide guards above the lower edge may be installed at a 60-degree angle to the roof surface. (See illustration at left.)
  All roof brackets and slide guards must bear on solid surfaces.

Guardrail systems

Guardrail systems are vertical barriers consisting of top rails, *midrails*, and intermediate vertical members. Guardrail systems can also be combined with toeboards, which are barriers that prevent materials and equipment from dropping to lower levels. OR-OSHA's design and performance requirements for guardrail systems are in Division 3, Subdivision M, 1926.502(b), and include the following:

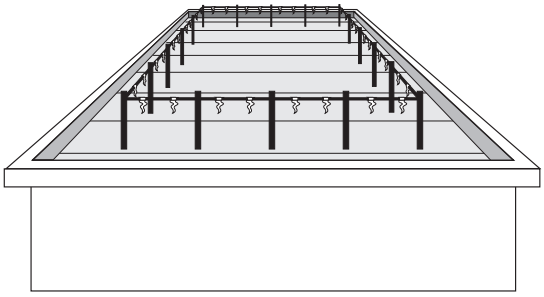


A guardrail system (background).

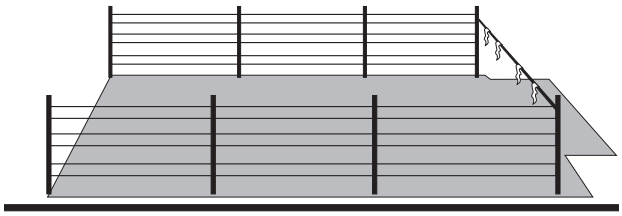
- Guardrail systems must be free of anything that might cut a worker or snag a worker's clothing. All guardrails must be at least one-quarter-inch thick to reduce the risk of hand lacerations. Steel or plastic banding is not permitted for top rails or midrails.
- Wire rope used for a top rail must be marked at least every six feet with high-visibility material.
- The top edge of a guardrail system must be 42 inches, plus or minus three inches, above the surface to which it is attached. The top-edge height can exceed 45 inches when conditions warrant; however, the guardrail system must meet all other performance criteria.
- Where there is no wall or parapet at least 21 inches high, screens, mesh, midrails, or similar protection must be installed between the top edge of the guardrail system and the working surface. Midrails must be installed midway between the top edge of the guardrail system and the working surface. Screens and mesh must extend from the top rail to the working surface.
- Intermediate vertical members, when used between posts, must be no more than 19 inches apart.
- The guardrail system must be capable of withstanding a 200-pound force applied within two inches of its top edge, in any outward or downward direction. Midrails, screens, and intermediate structural members must withstand at least 150 pounds applied in any downward or outward direction.

Warning line systems

Warning line systems consist of ropes, wires, or chains and supporting stanchions that form a barrier to warn workers they're near an unprotected roof side or edge. Warning line systems mark off an area within which roofers may work without using guardrails or safety nets; they can be combined with guardrail systems, personal fall-arrest systems, or safety monitoring systems to protect workers doing roofing work on low-slope roofs (4:12 or less). The design and performance requirements for warning line systems are covered in Division 3, Subdivision M, 1926.502(f).



A warning line system.



A controlled-access zone.

Controlled-access zones

A controlled access zone defines an area where workers can do *leading-edge, overhand bricklaying* and related work, or work under a fall-protection plan, without using conventional fall protection. All others are prohibited from entering a controlled access zone. The zone is created by erecting a control line, or lines, to restrict access to the area. The control line warns workers that access to the zone is limited to authorized persons. Control lines must meet the following criteria:

- Consist of ropes, wires, tapes, or equivalent materials and supporting stanchions.
- Be flagged at least every six feet with high-visibility material.
- Be no less than 39 inches from the working surface at its lowest point and no more than 45 inches from the working surface at its highest point (50 inches in overhand bricklaying operations).
- Have a minimum breaking strength of 200 pounds.

Division 3, Subdivision M, 1926.502(g) includes the design and performance requirements for controlled access zones.

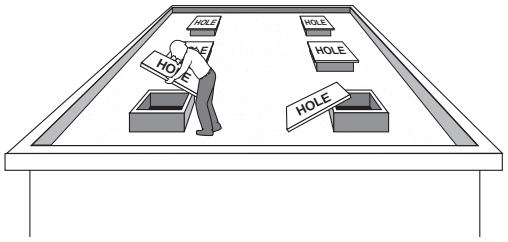
Warning/barrier lines and barricades

Warning or barrier lines and barricades may be used to protect employees on elevated surfaces (not including steel erection) performing work other than roofing when the following guidelines are followed:

- The warning/barrier lines or barricades must be at least 6 feet back from the unprotected edge to eliminate the potential for an employee to stumble and fall over the edge.
- The work surface must be less than 1 in 12 pitch (almost flat).
- The warning/barrier lines or barricades may be used only for protection of employees from unprotected exterior edges. Interior openings, such as skylights or floor holes, must be guarded in accordance with Subpart M or Division 3, Construction.
- When any work is performed outside the warning/barrier lines or barricades, employees must be protected by a guardrail system, personal fall-arrest system, safety-net system or catch-platform system.

Covers

A cover includes any rigid object used to overlay openings in floors, roofs, and other walking and working surfaces. Covers must be able to support at least twice the maximum anticipated load of workers, equipment, and materials. Covers should have full-edge bearing on all four sides. All covers must be color-coded or marked with the word "HOLE" or "COVER" and must be secured to prevent accidental displacement. Division 3, Subdivision M, 1926.502(I) includes the design and performance requirements for covers.



All covers must be color-coded or marked with the word "HOLE" or "COVER."

Fences and barricades

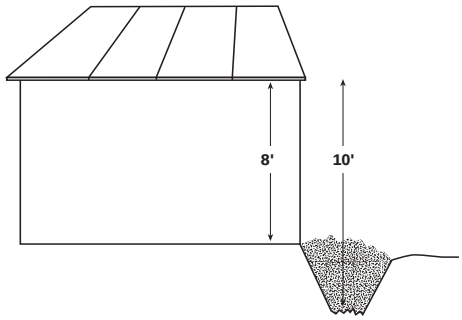
Fences are protective barriers, usually made of posts and wire or boards, that block unsafe areas such as wells, pits, and shafts. Barricades serve the same fall-protection functions as fences.

Safety monitoring systems

A safety monitoring system is a set of procedures assigned to a competent person for monitoring and warning workers who may be unaware of fall hazards. Safety monitoring systems are appropriate for roofing operations on low-slope roofs less than 50 feet wide. A safety monitoring system, used in conjunction with a controlled-access zone and a fall-protection plan, is also appropriate in situations where conventional fall protection is not feasible. Division 3, Subdivision M, 1926.502(h) includes the design and performance requirements for safety monitoring systems.

III. Framing and fall protection

The risk of falling makes framing one of the more hazardous activities in residential-type construction, so framers need to be especially aware of fall hazards. How framers protect themselves from falls also affects other work processes. For example, when framers install guardrails, covers, or handrails to protect themselves, that protection will also safeguard those who will be on the site during the next construction phase.



Backfilling footings and excavations can reduce potential fall distances.

Fall hazards at the ground level

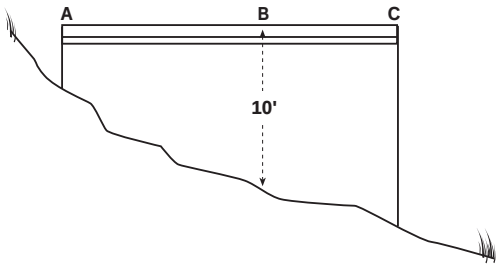
Start thinking about fall hazards even at ground level. When possible, backfill footings and other excavations before framing begins. Backfilling can reduce fall distances and, in some cases, even eliminate fall-protection requirements by reducing fall distance to less than 10 feet. Keep in mind that backfilled surfaces may be unstable and may not support ladders or scaffolds.

Fall hazards at the first-floor level

More homes and multi-family dwellings are being built on hillsides to offer views of Oregon's spectacular landscapes.

However, steep grades create fall hazards. Recently, a framer fell 25 feet while installing a first-floor beam in a home in Portland.

In the illustration on the right, the working surface from point A to point B is less than 10 feet above the ground — a worker doing residential-type construction between these points would not need to use fall protection. However, the working surface from point B to point C is more than 10 feet to the ground. A worker would need fall protection between points B and C.



Fall hazards can exist even at the first-floor level.

Remember: Once you have identified a fall hazard, you must eliminate it or reduce its risks. OR-OSHA gives you three fall-protection options when you do residential-type construction more than 10 feet above a lower level: guardrails, safety nets, or a personal fall-arrest system — the conventional fall-protection systems. You can use other types of fall protection, but only if a qualified person can demonstrate in a fall-protection plan that the conventional systems are either not feasible or actually create an additional fall hazard. Part Three offers guidelines on developing a fall-protection plan.

Wall framing

First-floor walls

Once the first floor has been sheeted, the walls are laid out and framed. Workers who set walls 10 feet or more above a lower level must protect themselves with safety nets, guardrails, or personal fall-arrest systems. Some framing contractors attach prefabricated steel guardrail uprights to the top plates of walls to provide fall protection throughout the floor-framing and sheeting process. However, this method has two drawbacks:

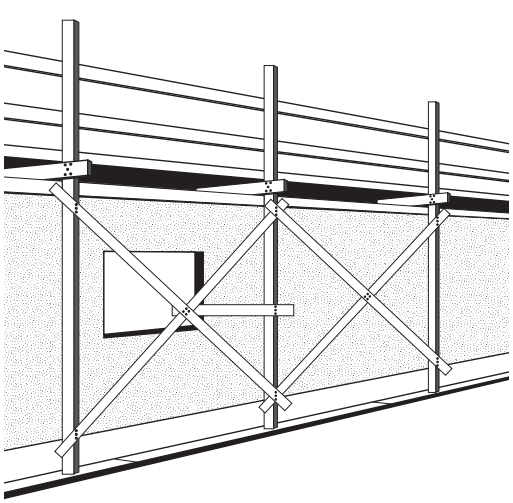
It doesn't allow sheeted walls to have the sheeting span below the bottom plate line to tie the structure together, and it can be difficult, if not hazardous, to remove.

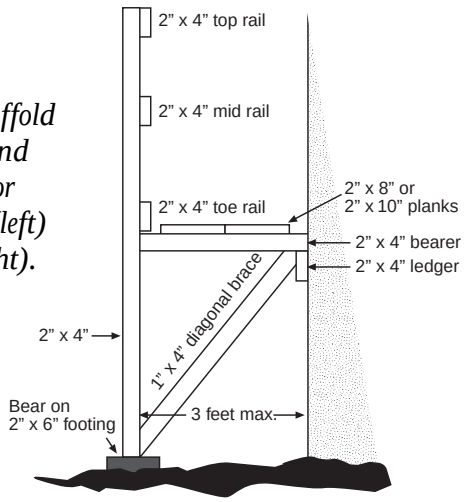
Install guardrails on all wall openings that are six feet or more above a lower level and that have an inside bottom edge less than 39 inches above the working surface. Some framers also install uprights for rails for the next floor at this stage. Once the walls are up, they take the place of guardrails.

When you use exterior walls for fall protection, the clear open space between the studs cannot be more than 18 inches. You will need to guard most windows, doors, and other wall openings with standard guardrails if the sill heights are less than 39 inches high. Walls framed with studs placed 16 inches on centers require no guardrails. Walls framed with studs 24 inches on centers should have guardrails for fall protection.

Upper floors

Second-floor joists are placed and nailed to the rim joist after the first-floor walls are framed. You can do this work from a ladder or from a scaffold attached to the walls. To attach the scaffold, nail short *ledger* boards on the





Two views of a scaffold built for placing and nailing second-floor joists. Front view (left) and side view (right).

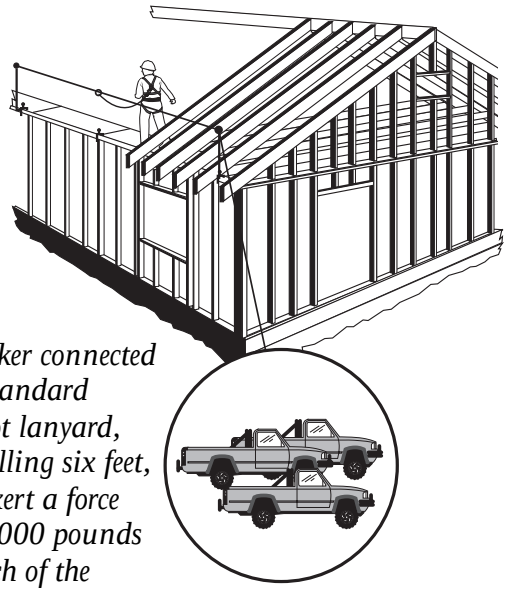
walls that run at a right angle from your bearing to support the platform. Often there are partition walls inside the structure that will also provide support. Before you build the scaffold, consider the following:

- How much weight do you expect the scaffold to hold? (It must support at least four times the expected load, including workers and materials.)
- What materials will you use to construct the scaffold?
- Can you allow at least 39 inches from the top of the exterior wall to the top of the scaffold platform?
- Is the scaffold platform more than 10 feet above a lower level? (If so, you will need to use guardrails, safety nets, or a personal fall-arrest system as fall protection.)

Be sure to install guardrails or covers around stairwells, fireplace openings, and any other unprotected floor openings when you frame upper floors. If you work from a scaffold or ladder and you are above wall openings, use additional guardrails on the openings.

Sheeting and decking

Many contractors consider using a personal fall-arrest system connected to a horizontal lifeline as fall protection for sheeting and decking work. However, they often overlook the fact that horizontal lifelines require much stronger anchors than vertical lifelines.



A worker connected to a standard six-foot lanyard, free falling six feet, will exert a force of 14,000 pounds on each of the horizontal lifeline anchors — the weight of three mid-size pickups.

A worker connected to a taut horizontal lifeline with a standard six-foot lanyard, free-falling six feet, will exert a force of 14,000 pounds on each of the lifeline's anchors (equal to the weight of three mid-size pick-ups). Because a fall can subject the anchors to extreme loads, use horizontal lifeline systems only if they are designed and installed under the supervision of a qualified person.

There's one other problem with connecting a personal fall-arrest system to a horizontal lifeline: OR-OSHA limits free-fall distance to six feet with a personal fall-arrest system; however, it's hard to limit free-fall distances to six feet because a horizontal lifeline will sag when subjected to a load. Tightening the lifeline to reduce sag is not a good solution to the problem. It puts the line under extreme tension and subjects anchors to even greater impact forces. (See *Understand horizontal lifeline forces*, Page 8, for more information.)

Framing and sheeting the roof

Setting and aligning trusses

You can work from a ladder or from a scaffold when you set roof trusses — or you can use a personal fall-arrest system if you can tie off to a secure anchor. If you decide to work from scaffolding, install the scaffold as high as possible on the wall. This will make it easier to set trusses and install blocking. You may be able to install a two-foot-wide piece of plywood, the "show board," on the trusses. If you intend to use roof brackets and slide guards, install them with the showboard. You must position the scaffold so that at least 39 inches of the wall serves as a guardrail. One advantage of using a scaffold is that you will not have to bend over to work, reducing the risk of back injury.

Working from a scaffold platform.

When you align trusses, you can walk on the top of the interior walls or bottom cords of the trusses without fall protection if the distance from your working surface to the lower level is less than 10 feet and openings to lower levels — such as those for stairwells and fireplaces — are covered.

Sheeting the roof

Roof brackets with slide guards and personal fall-arrest systems are effective fall-protection options for most roofing and sheathing operations. You must be certain that the roof system will support an anchor if you use a personal fall-arrest system; the anchor must be able to support a minimum 5,000-pound load. Anchors designed especially for personal fall-arrest systems and roofing work are available. Install and use these anchors according to the manufacturer's instructions. If you use roof brackets and slide guards as fall protection for roofing work, keep in mind the following:

- Use 2" x 6" brackets and slide guards on roofs sloped 3:12 through 6:12 with a ground-to-eave height not greater than 25 feet.
- Use 2" x 6" brackets and slide guards in multiples spaced no more than every eight feet vertically, on roofs sloped greater than 6:12 through 8:12 with a ground-to-eave height not greater than 25 feet.

Post and beam work

Post and beam work is common in residential-type construction. Before securing a personal fall-arrest anchor to a beam:

- Check the beam for damage or rot.
- Consider the direction-of-force of a potential fall. Some beams are installed to take a downward force but not an upward or lateral load. Be sure to add bracing or other support for suspect beams.
- Consider the grain of the wood and the beam's shear strength.

IV. Guidelines for developing a fall-protection plan

Fall-protection plan requirements.

A fall-protection plan enables workers doing *leading-edge work*, *precast concrete erection work*, or *residential-type construction work* to use alternative fall-protection systems or methods when conventional systems aren't feasible. Under these special circumstances, properly documented fall-protection plans give employers the flexibility to use more appropriate methods of fall protection. However, employers must be able to show that conventional systems are not practical or that they pose a greater safety hazard to workers than other fall-protection alternatives. In addition, the fall-protection plan must meet the following requirements:

- The plan must be prepared by a qualified person specifically for the site where the work will be performed.
- The plan must document why conventional fall-protection systems are not feasible and show how alternative methods will reduce or eliminate fall hazards.
- The plan must describe all measures that will be taken to minimize or eliminate fall hazards at the worksite.
- The employer must designate the work area as a controlled-access zone.
- Employers who do not use either alternative fall-protection measures or conventional systems must use a safety monitoring system to protect workers in the controlled-access zone.

OR-OSHA's requirements for fall-protection plans are covered in Division 3, Subdivision M, 1926.502(k).

An effective fall-protection plan can protect workers from fall hazards and enhance the overall level of safety at a job site. **If you decide to develop a fall-protection plan, use the following guidelines to keep your plan in line with OR-OSHA's requirements. OR-OSHA will use these guidelines to verify that your plan meets the intent of 1926.502(k).**

Explain why you can't use conventional systems

Before you can use a fall-protection plan, you must explain why conventional protection methods — guardrails, safety nets, personal fall-arrest, or fall-restraint systems — are not feasible or would pose a greater safety hazard to workers than your proposed method. Consider using scaffolds, catch platforms, or aerial lifts. If you can't eliminate the hazard, you must also explain why. Be specific! The following three examples help illustrate the point.

- If anchors capable of holding 5,000 pounds are not available, you must *also* explain why personal fall-arrest systems with 2:1 safety factors or fall-restraint systems will not protect workers.

- If you believe that having workers erect guardrails creates a greater hazard than an alternative method, you must explain why. You must demonstrate why erecting and dismantling guardrail systems creates a greater hazard than your alternative method and why you can't use personnel platforms, personal fall-arrest, or fall-restraint systems.
- If you feel that guardrail systems are not feasible because you can't anchor them in a finished surface, you must also consider free-standing guardrail systems that don't put holes in the finished surface. If you can't use free-standing systems, you must explain why.

Describe how your alternative method will protect workers

Describe specifically how your alternative fall-protection method will reduce or eliminate fall hazards. Include your workers' tasks, the fall hazards they'll encounter, the location of hazards, and how you intend to protect them from the hazards. You can list your responses in a table such as the one below.

How alternative fall-protection methods will reduce or eliminate fall hazards

The worker's task	The type of fall hazard (such as a floor opening or unprotected edge)	The location of the fall hazard	Alternative protection (how it will reduce or eliminate the fall hazard)

Appoint a qualified person to prepare the plan

A qualified person is someone who has extensive knowledge, training, and experience with fall-protection systems. A qualified person must know how to design, use, and install fall-protection systems; the limitations of fall-protection systems; and fall hazards associated with work tasks and processes. You must have a qualified person prepare and develop a site-specific fall-protection plan. A qualified person must also approve any changes to the plan. Be sure that the plan identifies the following:

- The construction activity (leading-edge, residential, or precast concrete erection)

- The site address where you will use the plan
- The name of the qualified person who prepared the plan
- The date the qualified person prepared the plan

Establish controlled-access zones where you can't use conventional protection

Your fall-protection plan must identify each area where you can't use guardrails, safety nets, or personal fall-arrest systems, and you must designate those areas as controlled-access zones. In addition, you must do the following:

- Describe how you will limit access to controlled-access zones, including procedures that authorize workers to enter controlled-access zones.
- Describe how you will identify controlled-access zones and how you will separate them from other work areas.
- Identify all workers who will enter controlled-access zones.

Assign supervisory responsibility to a competent person

A competent person is someone who can identify hazardous conditions and appropriate applications for a fall-protection system and who has authority to correct hazards. A competent person must know the site-specific fall-protection plan, how to perform work tasks safely, and the hazards associated with those tasks. You must designate a competent person to implement the fall-protection plan.

Document accountability

Your fall-protection plan must describe how workers and supervisors will comply with its requirements.

Establish a training program

Everyone covered by a fall-protection plan must be trained by a competent person. Be sure to document the names of those who receive fall-protection training and their training dates. The training program must cover the following:

- Fall hazards that workers will encounter
- Types of systems that will protect workers from falls
- Workers' responsibilities under the fall-protection plan
- Procedures for assembling, maintaining, and dissembling personal fall-arrest systems
- How workers should comply with the plan
- Retraining procedures when the plan changes, tasks change, or when workers are not following the plan

Update the plan when site conditions change

When worksite conditions change and affect how workers are protected from falling, you must update your fall-protection plan so that it addresses the changes. An on-site qualified person must approve the changed plan. The updated plan must:

- Describe the site condition changes that required the update
- Include the qualified person's reasons for the update
- Include the date the qualified person approved the plan changes and the person's signature

Investigate accidents

If a worker covered by a fall-protection plan falls or has a "near miss" incident, you must investigate the accident and, if necessary, change the plan so that similar events will not happen again. The plan must describe near misses or accidents and how to prevent future incidents.

Keep the plan at the job site

You must keep a copy of the fall-protection plan, with all approved changes, at the job site.

V. Fall-protection training

Employer responsibilities

Employers need to be aware of fall hazards in the workplace and they must take appropriate action to minimize those hazards. Selecting appropriate fall protection is the first step toward meeting that responsibility. The second step is training workers so they are familiar with the fall protection they will use. Division 3, Subdivision M, 1926.503 requires employers to provide training for all workers exposed to fall hazards. A competent person must provide training that ensures workers will recognize fall hazards and that they will use appropriate procedures to minimize exposure to the hazards.

In addition, workers who use personal fall-arrest systems must also know:

- How to wear the equipment
- The proper hook-up and attachment methods for the equipment
- Appropriate anchoring and tie-off techniques
- How to estimate free-fall distances
- Inspection and storage procedures for the equipment
- Self-rescue procedures and techniques

Retraining

Workers who do not recognize fall hazards at a particular work area must be retrained. Other reasons for retraining include changes at a worksite that make earlier training obsolete, changes in the types of fall-protection equipment used by workers, or a worker's failure to use fall-protection equipment effectively.

Documenting training

Employers must maintain a written record of each worker's fall-protection training. The record must document the worker's name, the date the worker was trained, and the trainer's signature.

Checklists and form in the Appendix.

In the Appendix, you'll find a form and checklists to help you keep track of fall hazards and fall protection systems at your worksite. Use the checklists to identify fall-hazards and fall-protection systems. Use the form to certify workers who have been trained to identify workplace fall hazards and to use fall-protection systems effectively.

VI. Working safely from ladders and scaffolds

Working from ladders

Ladders of all types are used in residential construction work. Within the Oregon construction industry, falls from ladders account for many fall-from-elevation injuries. Most injuries associated with the falls result from slips, loss of footing, and unstable ladders. OR-OSHA's safety requirements for ladders are included in Division 3, Subdivision X; the following are relevant to residential-type construction work.

Coated wood ladders. Wood ladders cannot be coated with any opaque covering except for identification or warning labels placed only on one face of a side rail.

Ladder surfaces. Ladders must have surfaces that will not cut workers or snag their clothing.

Load capacities. Self-supporting portable ladders must be able to support at least four times their maximum intended loads. (Maximum intended load means the combined weight of workers, equipment, tools, and materials.)

Rungs, cleats, and steps. Ladder rungs, cleats, and steps must be parallel, level, and uniformly spaced not less than 10 nor more than 14 inches apart. Rungs and steps must be shaped or treated to minimize slipping.

Spreaders and locking devices. A metal spreader or locking device is required to hold the front and back section of a stepladder in an open position when the ladder is being used.

Ladders tied together. Ladders cannot be tied or fastened together to make longer sections unless they are designed for that purpose.

Using two or more ladders. Two or more separate ladders used to gain access to an elevated work area must be offset with a platform or a landing between them.

Training requirements

Workers who use ladders must receive training by a competent person that covers the following:

- The nature of fall hazards in the work area
- The proper construction, use, placement, and care of the ladders
- The maximum intended load-carrying capacities of the ladders
- The requirements in Subdivision X for the ladders workers will use

Safe practice guidelines for ladder work

Workers could virtually eliminate ladder falls by observing the following safe work practices.

- ❑ Select a ladder that's appropriate for the job or task. It must extend at least 36 inches above the access area it serves.
- ❑ Inspect the ladder before using it; it should be dry, clean, and undamaged.
- ❑ Angle the ladder properly; position the base so that the distance to the building is least than one-fourth the ladder's length. The minimum slope should be 50 degrees.
- ❑ Protect the base of the ladder so that people or vehicles won't strike it.
- ❑ Face the ladder and keep both hands on the side rails.
- ❑ Raise and lower heavy loads with a hand line or hoist.
- ❑ Make sure metal ladders have steps and rungs with skid-resistant surfaces.
- ❑ Allow only one person to work from a ladder; use a scaffold when two or more people must work together.
- ❑ Keep off the top steps of portable ladders.
- ❑ Keep ladders with conductive side rails away from exposed, energized equipment.

Working from scaffolds

A scaffold is a temporary elevated platform that holds workers and materials. However, even an upside-down bucket qualifies as a scaffold under this definition. Though some workers use makeshift "scaffolds" to work above lower levels, they probably don't know that falls are involved in 80 percent of scaffold-related injuries and that the victims of most scaffold accidents have little or no scaffold training.

Everyone who uses scaffolds should be familiar with how they are built and with OR-OSHA's requirements for using them safely. The following scaffold requirements, from Division 3, Subdivision L, are relevant to residential-type construction work.

Access. Scaffolds must be equipped with an access ladder or a similar means for safe access. Ladders built into the end-frames of scaffolds must have a clear distance of 16 inches between side rails. The rungs must be equally spaced not less than 10 inches or more than 14 inches apart.

Damaged scaffolds. Damaged scaffolds and accessories must be immediately repaired or replaced.

Falling object protection. Those working on a scaffold platform as well as those working below the scaffold must be protected from falling objects.

Footing. The surface on which the scaffold is built must be able to support the scaffold's maximum intended load (the combined weight of workers, equipment, tools, and materials) without settling. Unstable objects, such as boxes or barrels, cannot be used to support scaffolds or planks.

Guardrails and toeboards. Platforms more than 10 feet above a ground floor must have guardrails with horizontal top rails and toeboards installed

on all open sides and ends. Site-built scaffolds four to 10 feet high and less than 45 inches long or wide must have standard guardrails installed on all open sides and ends. Guardrails must be 2" x 4" or the equivalent and approximately 42 inches high with a midrail. The supports must not be more than eight feet apart. Toeboards must be at least four inches high.

Load capacity. Scaffolds and components must be able to support their own weight and at least four times their maximum intended loads.

Planking. Platform planking must be scaffold grade or equivalent and must be overlapped at least 12 inches or secured so that it will not move. Scaffold planks must extend over their end supports at least six inches and not more than 12 inches.

Poles, legs, uprights. Scaffold poles, legs, or uprights must be vertical and be securely braced.

Set up, moving, dismantling. Scaffolds must be set up, moved, and dismantled under the supervision of a competent person.

Slippery conditions. Slippery conditions on scaffold surfaces must be eliminated as soon as possible after they occur.

Training requirements

Those who work from scaffolds must be trained to recognize scaffold hazards and to control or minimize the hazards. Training must cover the following:

- Electrical hazards related to scaffold work
- Fall hazards and methods to control the hazards
- How to use scaffold walkways, platform components, and access areas
- Scaffold load capacities and appropriate types of loads

Those who erect or dismantle scaffolds must be trained by a competent person. Training must cover scaffold hazards, erecting and dismantling procedures, design criteria, and load capacities.

Safe practice guidelines for scaffold work

- ❑ Use ladders or stairs to reach platforms that are more than two feet above or below scaffold access points. Never climb cross-braces to reach a scaffold platform.
- ❑ Inspect components, connections, and planks frequently.
- ❑ Keep scaffolds plumb and square. Don’t use bricks, blocks, barrels, or other unstable objects to level a scaffold.
- ❑ Repair or replace damaged scaffold components immediately. A competent person should inspect the components before each work shift. Never modify or mix components made by different manufacturers.
- ❑ Be aware of nearby electrical hazards and slippery platform surfaces.
- ❑ Make sure scaffolds are guarded to protect workers from falling objects and to keep objects from falling off platforms.
- ❑ Don’t use makeshift methods to raise the working height of a scaffold platform.

VII. Preparing for emergencies

The employer must ensure that a worker who falls is promptly rescued.

Fall-protection systems are designed to minimize workers' exposure to fall hazards and to reduce their risk of injury if they do fall. Nevertheless, employers must establish procedures to ensure that workers who fall receive *prompt* emergency and medical attention. Emergency procedures should identify key rescue and medical personnel, equipment available for rescue, emergency communications procedures, retrieval methods, and primary first-aid requirements.

Workers in 911 service areas can use this number for ambulance service; however, most 911 responders are not trained to rescue an injured worker suspended in a personal fall-arrest system. Emergency procedures must ensure prompt rescue of a suspended worker. The 911 number does not ensure prompt rescue.

Use the following guidelines to develop emergency response procedures.

Before on-site work begins

Make fire department or other emergency responders aware of any conditions at the site that may hinder a rescue effort.

- ❑ Document rescue procedures and make sure they're posted at the worksite.
- ❑ Post emergency-responder phone numbers and addresses at the worksite.
- ❑ Mark the worksite with signs noting the easiest routes in and out of the site.
- ❑ Make sure responders have quick access to rescue and retrieval equipment such as lifts and ladders.

As on-site work progresses

- ❑ Identify on-site equipment that can be used for rescue and retrieval. Examples: aerial lifts, ladders, and forklifts.
- ❑ Maintain a current equipment inventory at the site. Equipment may change frequently as the job progresses.
- ❑ Re-evaluate and update the emergency response plan if on-site work tasks change.

If an emergency occurs

- ❑ Call 911 or other emergency numbers in the emergency-response plan. First responders should clear a path to the victim. Others should direct emergency personnel to the scene.
- ❑ Make sure only qualified personnel attempt a technical rescue.

- ❑ Prohibit all nonessential personnel from the fall-rescue site.
- ❑ Talk to the fall victim; determine the victim's condition, if possible.
- ❑ If the victim is accessible, make the victim comfortable and check vital signs. If necessary, administer CPR and attempt to stop bleeding.

Investigating an accident

- ❑ **Report fatalities and catastrophes to OR-OSHA within eight hours. Report injuries requiring overnight hospitalization and medical treatment other than first aid within 24 hours.**
- ❑ Identify all equipment associated with the accident and put it out of service until the investigation is finished.
- ❑ Document what went wrong, step by step.
- ❑ Review the fall-protection procedures; determine how the procedures could be changed to prevent similar accidents; revise the procedures accordingly.
- ❑ Have a competent person examine equipment associated with the accident. If the equipment is damaged, repair or replace it. If the equipment caused the accident, determine how and why.

Appendix: Checklists and training record examples

Use this checklist to identify fall-hazard areas at your worksite.

Fall-hazard checklist

Check all boxes that apply. Check "**Yes**" if hazards exist at your worksite; check "**N/A**" if not.

Hazard	Yes	N/A
Hoist areas		
Holes		
Formwork		
Rebar		
Runways		
Excavations		
Dangerous equipment		
Overhead bricklaying		
Floor joists and trussing		
Floor sheathing		
Erecting exterior walls		
Roof trussing and raftering		
Roof sheathing		
Roofing		
Wall openings		
Falling objects		

Use this checklist to identify the fall-protection system training each worker received at your worksite.

Fall-protection systems checklist

Fall-protection system	**Training received**									
	N/A		Installation		Maintenance		Inspection		Disassembly	
Guardrail systems										
Personal fall-arrest systems										
Safety net systems										
Controlled access zones										
Roof brackets										
Covers										
Fences and barricades										
Safety monitoring systems										

Name of worker:_____

You may use this form to record fall-protection training; however, this form is only an example. Whatever means of training record you use must include *the name of the employee trained, the training date(s)*, and *the trainer's signature*.

Training record

_____**[Employer name]**_____ has a written company safety and health program that details its responsibilities under OR-OSHA's fall-protection rule, OAR 437, Division 3, Subdivision M. In accordance with Section 1926.503, all employees of _____**[Employer name]**_____ will be trained by a competent person prior to any job assignment where fall protection is required. The training will enable each employee to recognize fall hazards and to follow appropriate procedures that minimize the hazards.

The following employees have been trained to recognize fall hazards and to use appropriate fall-protection systems and methods to minimize exposure to the hazards.

Name of employee trained	Date employee was trained	Trainer's signature

Definitions of selected terms

Anchor

A secure point of attachment for workers' lifelines, lanyards, or deceleration devices. Anchors must be capable of supporting a minimum load of 5,000 pounds per worker (or designed, installed, and used under the supervision of a qualified person as part of a complete personal fall-arrest system which maintains a safety factor of at least two).

Barricade

An obstruction to deter the passage of persons or vehicles.

Body harness

Straps that an individual wears to distribute fall-arresting forces over the thighs, waist, chest, shoulders, and pelvis. Attaches to other components of a personal fall-arrest system. The maximum safe arresting force for a body harness is 1,800 pounds.

Competent person

A person who is capable of identifying existing and predictable hazards in the work environment and who has authorization to take prompt measures to eliminate the hazards.

Connector

A device used to couple (connect) components of a personal fall-arrest system. The connector may be an independent component (such as a carabiner) or an integral component (such as a buckle or D-ring) of the system. Connectors must be drop-forged or made of equivalent materials; they must have a corrosion-resistant finish and all surfaces and edges must be smooth to prevent damage to other parts of the system.

Controlled-access zone (CAZ)

An area designated for overhand bricklaying operations or leading edge construction. Conventional fall-protection systems — guardrail systems, personal fall-arrest systems or safety net systems — are not required in a CAZ; access is restricted to all workers except those performing overhand bricklaying and leading edge construction tasks.

Conventional fall protection

A guardrail system, safety net system, or personal fall-arrest system

Cover

A rigid object used to overlay openings in floors, roofs, and other walking and working surfaces.

Deceleration device

Any mechanism that dissipates or limits energy imposed on a person during fall arrest. Examples include rope grabs, ripstitch lanyards, special woven lanyards, and automatic self-retracting lifelines.

Deceleration distance

The additional vertical distance a worker falls before stopping — excluding lifeline elongation and free-fall distance — from the point at which a deceleration device begins to operate. The distance is measured from

the worker's body harness attachment point just before the device activates to the attachment point after the worker comes to a full stop.

D-rings

Attachment points on a body harness for deceleration devices or lanyards. D-rings must be capable of sustaining a minimum tensile load of 5,000 pounds.

Equivalent

Refers to an alternative design, material, or method that an employer can demonstrate will provide an equal or greater degree of safety for workers than the method or item specified in a standard.

Fall-protection plan

Enables workers doing *leading-edge work*, *precast concrete erection work*, or *residential-type construction work* to use alternative fall-protection systems or methods when conventional systems aren't feasible. To implement a fall-protection plan, employers must be able to show that conventional fall-protection systems are not practical or add to worker risk.

Fall-restraint system

A fall-protection system designed to physically prevent a worker from free falling. Components include a body harness, a rope or web lanyard, connectors, and an anchor. Fall-restraint systems are not covered in OR-OSHA's Subdivision M requirements for fall protection in the construction industry.

Free fall

Falling before fall protection begins to arrest the fall.

Free-fall distance

The vertical distance a worker falls before a personal fall-arrest system stops the fall; measured from the attachment point of the personal fall-arrest system immediately before and after the fall, excluding deceleration distance and lanyard and lifeline elongation, but including deceleration device slide distance or self-retracting lifeline/lanyard extension before fall-arrest forces occur.

Guardrail system

Vertical barriers erected to prevent workers from falling to a lower level.

Hole

Any opening more than two inches wide in a floor, roof, or other walking and working surface.

Horizontal lifeline

A flexible horizontal cable or rope line anchored at both ends to which a worker's body harness or lanyard attaches. Horizontal lifelines must be designed, installed, and used under the supervision of a qualified person, as part of a complete personal fall-arrest system.

Lanyard

A flexible rope, strap, or webbing that connects body harness to a deceleration device, lifeline, or anchor. Lanyards that tie off one worker must have a minimum breaking strength of 5,000 pounds. Lanyards that

automatically limit free-fall distance to two feet or less must have components capable of sustaining a minimum static tensile load of 3,000 pounds with the lanyard in the fully extended position.

Leading edge

The edge of a floor, roof, formwork, or other walking and working surface that changes location as additional sections are placed. Leading edges not actively under construction are considered unprotected sides and edges.

Ledger board (stringer)

A horizontal scaffold member that extends from post to post and that supports the putlogs or bearer, forming a tie between the posts.

Lifeline

A flexible line that attaches directly to a person's body harness, lanyard, or deceleration device at one end and to an anchor at the other end. A lifeline that hangs vertically and is connected to one anchor is a vertical lifeline. A lifeline that stretches horizontally between two anchors is a horizontal lifeline. All lifelines must be protected against cuts or abrasions. They cannot be made of natural fiber rope.

Lower level

Surface to which a worker can fall. Examples: ground levels, floors, ramps, runways, excavations, pits, tanks, material, water, and equipment.

Midrail

A rail approximately midway between the guardrail and platform, secured to the uprights erected along the exposed sides and ends of platforms.

Opening

Any space more than 30 inches high and 18 inches wide in a wall or partition, through which workers could fall to a lower level.

Overhand bricklaying

Bricklaying and masonry tasks requiring a mason to work while leaning over a wall.

Personal fall-arrest system

A conventional fall-protection system designed to stop a single worker from free falling to a lower level. Components include an anchor, connectors, a body harness, and may include a lanyard, deceleration device, or lifeline.

Platform

A temporary elevated working surface such as the floor of a scaffold.

Putlog

A scaffold member upon which the platform rests.

Qualified person

A person who by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to resolve problems relating to a specific subject, operation, or project.

Residential-type construction

Construction work on all types of structures, including commercial buildings, that are framed and covered with materials commonly associated with residential structures. Residential-type construction does not include tilt-up buildings, butler-type buildings, or large commercial structures.

Roof brackets and slide guards

Used in residential construction to prevent workers from sliding off a sloped roof.

Rope grab

A deceleration device that moves along a vertical lifeline; it automatically engages and locks on the lifeline when a worker falls.

Roof

The exterior surface on the top of a building. Does not include floors or formwork which, if a building is not completed, temporarily become the top surface.

Roofing work

Includes hoisting, storing, applying, and removing roofing materials and equipment.

Safety factor

The weight ratio of a breaking load to safe load. For example, the anchor for a personal fall-arrest system must be able to hold at least 5,000 pounds or it must be installed under the supervision of the qualified person and it must maintain a *safety factor* of at least two — two times the impact force of a worker free falling six feet.

Safety monitoring system

A fall-protection system that requires a monitor (competent person) to be responsible for recognizing fall hazards and warning workers when they are at risk of falling.

Safety net system

A fall-arrest system of mesh nets, including panels, connectors, and other impact-absorbing components.

Sag angle

A horizontal lifeline's angle of deflection when the line is subjected to a load.

Scaffold

Any temporary elevated platform and its supporting structure used for supporting workers, materials, or both.

Self-retracting lifeline/lanyard

A deceleration device consisting of a drum-wound line that retracts or extends from the drum with normal worker movements; in the event of a fall, the drum automatically locks. Self-retracting lifelines that automatically limit free-fall distance to two feet or less must have components

capable of sustaining a minimum static tensile load of 3,000 pounds. Self-retracting lifelines that do not limit free-fall distance to two feet or less must be capable of sustaining a minimum tensile load of 5,000 pounds.

Snap hook

A connector, consisting of a hook-shaped member and a keeper that can be opened to receive an object and, when released, automatically closes to retain the object.

Suspended scaffold

A scaffold supported on wire or other ropes, used for work on, or for providing access to, vertical sides of structures on a temporary basis.

Swing fall

The pendulum motion that results when a worker using a personal fall-arrest system falls and swings back under the system's anchor point.

Tie off

The act of connecting to an anchor; tied-off means being connected to an anchor.

Tie-off adaptor/beam connector

Devices that anchor vertical lifelines or lanyards to I-beams and other objects with rough edges.

Toeboard

A low protective barrier that prevents materials, equipment, and personnel from falling to lower levels.

Vertical lifeline

A flexible vertical cable or rope line anchored at one end; the other end attaches to a worker's body harness, lanyard, or deceleration device. Each worker must be attached to a separate vertical lifeline. Vertical lifelines must have a minimum breaking strength of 5,000 pounds.

Walking and working surface

Any surface (except on ladders, vehicles, or trailers) on which workers perform tasks or jobs.

Warning/barrier lines and barricades

A warning line or barrier erected or installed on a flat elevated surface to designate a safe work area. Workers are not allowed outside the designated safe work area without adequate fall protection.

Warning line system

A barrier erected on a roof to warn workers they are approaching an unprotected edge; designates an area for roofing work without conventional fall-protection systems (guardrail, safety net, or personal fall-arrest).

Work area

The portion of a walking/working surface where workers perform job tasks.

OR-OSHA services

OR-OSHA offers a wide variety of safety and health services to employers and employees:

Consultative Services

- Offers no-cost on-site safety and health assistance to Oregon employers for help in recognizing and correcting safety and health problems in their workplaces.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, new business assistance, and the Safety and Health Achievement Recognition Program (SHARP).

Enforcement

- Offers pre-job conferences for mobile employers in industries such as logging and construction.
- Provides abatement assistance to employers who have received citations and provides compliance and technical assistance by phone.
- Inspects places of employment for occupational safety and health rule violations, and investigates workplace safety and health complaints and accidents.

Standards & Technical Resources

- Develops, interprets, and provides technical advice on safety and health standards.
- Provides copies of all OR-OSHA occupational safety and health standards.
- Publishes booklets, pamphlets, and other materials to assist in the implementation of safety and health standards and programs.
- Operates a Resource Center containing books, topical files, technical periodicals, a video and film lending library, and more than 200 databases.
- Manages the Worksite Redesign Grant Program, which awards grants to develop and implement solutions to workplace safety, health, and ergonomic problems.

Public Education & Conferences

- Conducts conferences, seminars, workshops, and rule forums.
- Coordinates and provides technical training on topics like confined space, ergonomics, lock-out/tag-out, and excavations.
- Provides workshops covering basic safety and health program management, safety committees, accident investigation, and job safety analysis.
- Manages the Voluntary Protection Program and the Safety and Health Education and Training Grant Program, which awards grants to industrial and labor groups to develop occupational safety and health training materials for Oregon workers.

For more information, call the OR-OSHA office nearest you. (All phone numbers are voice and TTY.)

Salem Central Office
350 Winter St. NE, Rm. 430
Salem, OR 97301-3882
Phone: (503) 378-3272
Toll free: (800) 922-2689
Fax: (503) 947-7461

Portland
1750 NW Naito Parkway, Ste. 112
Portland, OR 97209-2533
(503) 229-5910
Consultation: (503) 229-6193

Salem
DAS Bldg. 1st Floor
1225 Ferry St. SE
Salem, OR 97310-1330
(503) 378-3274
Consultation: (503) 373-7819

Eugene
1140 Willagillespie, Ste. 42
Eugene, OR 97401-2101
(541) 686-7562
Consultation: (541) 686-7913

Bend
Red Oaks Square
1230 NE Third St., Ste. A-115
Bend, OR 97701-4374
(541) 388-6066
Consultation: (541) 388-6068

Medford
1840 Barnett Rd., Ste. D
Medford, OR 97504-8250
(541) 776-6030
Consultation: (541) 776-6016

Pendleton
721 SE Third St., Ste. 306
Pendleton, OR 97801-3056
(541) 276-9175
Consultation: (541) 276-2353

Visit us on the Internet World Wide Web at: www.orosha.org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