Oregon OSHA

Fall protection
for construction activities

DCBS | Consumer and Business Services
Oregon OSHA

About this guide

***Fall protection for construction activities* is an Oregon OSHA Standards and Technical Resources publication.**

Who should read this guide?

This guide is for anyone who wants to understand fall protection concepts and best practices when performing construction activities. It's also for those who don't have a professional background in fall protection systems and who want to understand the requirements in Division 3, Subdivision M, *Fall Protection*. The guide also highlights fall protection requirements for work on ladders and scaffolds.

How the guide is organized

- Parts one and two describe what to consider before on-site work begins.
- Part three describes how to identify and evaluate fall hazards — essential fall protection activities.
- Parts four and five describe how to get safely to the work area.
- Part six describes fall protection systems, methods, and the requirements for using them.
- Parts seven, eight, and nine cover fall protection training, equipment maintenance, and emergency planning.

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What's new?

General fall protection trigger height in construction:

Starting Jan. 1, 2017, the general fall protection trigger height is lowered from 10 feet to six feet.

Slide guards systems:

Starting Oct. 1, 2017, the use of slide guards as the only or primary method of fall protection is prohibited.

Introduction

Falls from heights contribute to more deaths in construction than any other hazard. A fall can occur in a split second without any time for the worker to react. Using fall protection can mean the difference between life and death.

What is fall protection?

Ask 10 people what fall protection means and you are likely to get 10 different answers. For many in the construction industry, equipment is the first thing that comes to mind: guardrails, personal fall protection systems, or safety nets, for example. But fall protection is more than equipment. Fall protection is also what you do to eliminate fall hazards, to prevent falls, and to ensure that workers who do fall don't die.

You accomplish fall protection by doing the following:

- Ensure that everyone has a role to play in preventing falls.
- Identify and evaluate fall hazards.
- Eliminate fall hazards, whenever possible, rather than using personal fall protect systems.
- Train workers to recognize fall hazards and how to protect themselves.
- Use appropriate systems and methods to prevent falls and to protect workers if they do fall.
- Inspect and maintain fall protection equipment before and after using it.
- Become familiar with Oregon OSHA's fall protection rules.

Why we need protection from falling

We need protection because even if we are experienced with working at heights, we can still lose our balance or grip. We can slip, trip, or misstep, and fall at any time. We may think that our reflexes will protect us, but we can fall before we have time to react. And we don't have to fall far to get hurt.

What is your fall protection role?

Everyone involved in a construction project has a role to play in preventing falls.

Employers: Prevent falls by planning to safely get the job done, providing the right fall protection equipment, and training all workers to use the equipment safely.

Employees: Follow safe work practices, properly use fall protection equipment and participate in training. Recognize fall hazards and unsafe practices, know the jobs that increase the risk of falling, and understand how to eliminate and control exposures to fall hazards.

General contractors: Take reasonable steps to provide for frequent and regular inspections of the jobsite to identify hazards and to eliminate or control employee exposure to them, including fall hazards.

Architects and engineers: Educate employers about hazards that could expose workers to falls during each phase of a construction project. When designing buildings and structures, consider fall protection and other safety needs for those who will do the construction work and those who will eventually need to perform maintenance.

Building owners and managers: Ensure that those who do exterior construction or maintenance work know how to protect themselves from falls, are aware of the location of installed anchorages, and know how to use their fall protection equipment. Maintain engineering documentation on permanently installed anchors for future reference.

Equipment manufacturers: Ensure that fall protection equipment meets OSHA and American National Standards Institute (ANSI) safety requirements and protects workers when they properly use it. Warn workers through instruction manuals and equipment labels about the danger of improperly using equipment.

Lawyers: Review your client's construction bids to ensure they comply with Oregon OSHA requirements. The documents should clearly state the client's responsibilities for protecting workers from falls and for identifying and controlling hazards that cause falls.

This roofing company was cited for a repeat violation for failing to provide its employees with fall protection.

Part one – Falling: truths and consequences

- How Oregon construction workers fall
- Falls in Oregon

How Oregon construction workers fall

Table 1 shows that falls from ladders account for nearly half of all disabling falls. Causes may include selecting the wrong type of ladder, using a damaged ladder, improper use, and incorrect placement and setup.

Table 1: Accepted disabling workers' compensation claims for falls to a lower level, 2013-2015

Type of fall	Number	Percent
From ladder	344	44.4
From roof	119	15.4
From vehicle	97	12.5
From scaffolding	63	8.1
From structure	48	6.2
Down stairs	30	3.9
To lower level, other	26	3.4
From building material	14	1.8
From floor or walkway	11	1.4
From surface, other	11	1.4
From ground to lower level	9	1.2
From building to lower level	2	0.3

Source: DCBS Central Services Division, Information Technology and Research (Construction NAICS 23*)

Falls in Oregon

The following are descriptions of some real workplace events in which Oregon workers sustained fatal injuries from falling:

Fall from ladder. A carpenter was standing on a stepladder installing trim around a new skylight fixture. He lost his balance and fell, striking his head on a cast-iron wood stove nearby.

Fall from roof. A roofer was installing shingles on the roof of a two-story home. It was early morning and the rooftop was covered in frost. He slipped on the roof and fell off the edge, falling 20 feet to the concrete sidewalk.

Fall from scaffolding. A carpenter was working at a bridge construction site standing on wooden scaffolding not wearing his fall protection harness. He stepped off the edge and fell 23 feet to the ground.

Fall from ladder. An electrician was on the roof of a school. He stepped down onto a 10-foot stepladder to exit the roof and the ladder kicked out from under him, causing him to fall approximately 10 feet to the ground.

Fall from roof. An employee was going up on the roof to reinstall anchors to finish sheeting. He stepped on a piece of plywood that was not secured and fell through the trusses approximately 19 feet to concrete.

Fall from structure. A framing foreman was at a construction site with a crew installing roof trusses on a new, one-story building. The roof trusses collapsed and the framing foreman fell to the floor below.

Fall from roof. A satellite installer was on top of a multi-level roof home repositioning a satellite dish for a customer when he slipped and fell. He slid approximately 15 feet down the rooftop on his back before his feet caught on the gutter. He flipped over the edge of the roof, falling 10 feet to the grass lawn.

Fall from ladder. A plumber fell from a 12-foot wooden ladder to a concrete floor.

Fall from vehicle. A dump truck driver was trying to unload some heavy equipment when he fell from the truck trailer approximately seven feet to the ground.

Remembering these tragic events may help prevent future losses.

Photo: Mark Sullivan, Oregon OSHA

Before you start a construction project, think about the hazards workers may encounter and what you can do to keep workers safe to prevent fall exposures like this.

Part two – Preparing to prevent falls

- Make fall protection part of your safety program
- Prepare a safety policy
- **Designate competent persons and qualified persons**
- Duties and responsibilities of competent **and qualified persons**
- Summary: Preparing to prevent falls

Make fall protection part of your safety program

Make fall protection part of your safety program and ensure that everyone has a role to play in preventing falls. Most successful programs have the following elements:

Management commitment. Business owners and managers are as committed to workplace safety as they are to any other critical part of the business.

Accountability. Supervisors and employees are held accountable for following safe work practices.

Employee involvement. Employees are involved in the day-to-day effort to maintain a safe workplace.

Hazard identification. Supervisors and employees know how to identify hazards.

Hazard control. Supervisors and employees know how to eliminate or reduce exposure to hazards.

Accident and incident investigation. Accidents and near-miss incidents are investigated and their causes are prevented from happening again.

Training. Employees learn safe work practices through training and instruction.

Evaluation. Business owners and managers evaluate their safety performances at least annually and use the evaluation to set new goals to improve performance.

Prepare a safety policy

Does your company have a written safety policy? It should as a best practice. A written policy reflects commitment to a safe and healthful workplace, summarizes management and employee responsibilities, and emphasizes the safety program's role. Keep the policy brief, commit to it, and enforce it.

A good safety policy ensures that everyone has a role to play in preventing falls.

Example of a workplace safety policy
Business commitment. Our company is committed to a safe and healthful workplace for all its employees. Our safety program involves all employees in the effort to control workplace hazards. All employees, including managers and supervisors, are held accountable for following this policy.
Management responsibilities. Our managers are responsible for preventing injuries and illnesses and considering all suggestions for achieving a safe workplace. Managers will stay informed about workplace hazards and will review the safety program at least once a year.
Supervisors' responsibilities. Our supervisors are responsible for supervising and training employees to work safely. Supervisors must enforce safe practices and correct hazardous conditions.
Safety committee responsibilities. Our safety committee includes management representatives and employee representatives who are responsible for identifying hazards and recommending how to eliminate or control them. The committee is also responsible for helping managers review the safety program's strengths and weaknesses.
Employees' responsibilities. Our safety program achieves success through our employees. All employees are responsible for identifying and reporting hazards immediately to their supervisors or safety committee representatives, for following safe work practices, and for using required personal protective equipment.

Designate competent persons and qualified persons

Many of Oregon OSHA's construction rules refer to *competent* persons and *qualified* persons. Federal OSHA created these terms to designate those who can evaluate hazardous conditions and mechanical systems, inspect equipment, and train others to work safely.

Who can be a competent or qualified person? OSHA provides the following definitions:

Competent person. "One who is capable of identifying existing and predictable hazards in the working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them." [1926.32(f)]

Subdivision R (*Steel Erection*) also adds the following: "In Oregon, a competent person is considered to be someone with equivalent skills as a qualified person in identifying existing and potential hazards in the workplace, while also being authorized by the employer or employer's representative to take immediate corrective action to control or eliminate hazards."

Qualified person. “One who, by possession of a recognized degree, certificate, or professional standing, or by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.” [1926.32(m)]

Federal OSHA doesn’t provide specifics for determining who can assume these roles. The following guidelines may help:

- Know the Oregon OSHA rules that apply to your workplace. The rules will tell you if you need to designate a competent or a qualified person.
- If an Oregon OSHA rule requires a competent person or qualified person, note the person’s duties and responsibilities.
- If an Oregon OSHA rule requires a competent person, that person must have the authority to take prompt corrective measures to eliminate hazards.
- Determine the knowledge, training, and experience the person needs to meet the rule’s requirements.
- Designate a person whose knowledge, training, and experience meet the rule’s requirements.

Duties and responsibilities of competent and qualified persons

The competent person

- Serves as the monitor in a safety-monitoring system, is responsible for recognizing hazards that cause falls, and warns workers about hazards
- Determines whether safety nets meet Subdivision M requirements
- Inspects a personal fall-arrest system after it arrests a fall and determines if the system is damaged
- Evaluates any alteration in a personal fall-arrest system and determines if it is safe to use
- Trains employees how to recognize fall hazards and follow safety procedures

The qualified person

- Supervises design, installation, and use of horizontal lifeline systems to ensure that they can maintain a safety factor of at least two — twice the impact of a worker free-falling six feet
- Supervises design, installation, and use of personal fall-restraint anchorages
- Supervises design, installation, and use of personal fall-arrest anchorages

Summary: Preparing to prevent falls

Fall protection is what you do to eliminate or control hazards that cause falls and to ensure that if workers do fall, they don't die. Before you start a construction project, think about the hazards workers may encounter and what you can do to keep workers safe. Employers are responsible for enforcing safe work practices, identifying fall hazards, and preventing, eliminating, or controlling hazards.

- Prepare and have employees follow a workplace safety policy that includes fall protection.
- Determine whether you need to designate competent or qualified persons.
- Provide fall protection training to your employees.

This photo identifies multiple unsafe work practices including:

1) **No fall protection systems for workers six feet or more above a lower level**
2) **Poor lifting practice**
3) **No fall protection**
4) **No head protection from falling objects**
5) **Improper scaffolding design**
6) **Poor housekeeping**

Photo: OSHA Training Institute, Southwest Education Center

Part three – Identifying and evaluating fall hazards

- What is a fall hazard?
- How to evaluate fall hazards
- Fall protection trigger heights for construction
- Summary: Evaluating fall hazards

What is a fall hazard?

A fall hazard is anything in the workplace that could cause an unintended loss of balance or bodily support and results in a fall. Fall hazards cause accidents such as the following:

- A worker walking near the edge of an unprotected and elevated floor, trips over a protruding board.
- A worker slips while climbing an icy stairway with no handrail.
- A makeshift scaffold collapses under the weight of four workers and their equipment.
- A worker carrying a sheet of plywood on a flat roof steps into a skylight opening.

Photo: NIOSH/John Rekus/elcoshimages.org

Most fall hazards are foreseeable. You can identify them and eliminate or control them before they cause injuries.

How to evaluate fall hazards

Involve others. You may need others to help you evaluate fall hazards. Ask workers who may be exposed to fall hazards and their supervisors. Involving others also strengthens your safety program.

➲ ***Your workers' compensation insurance carrier will help you evaluate fall hazards. Contact your insurance carrier to request a consultation.***

➲ ***Contact Oregon OSHA's Consultative Services Section to schedule a free on-site evaluation, 503-378-3272.***

Determine how workers will access elevated surfaces to do their jobs. Will workers be using portable ladders, supported scaffolds, aerial lifts, or suspension platforms to reach work areas? Which ones will they use? How and where will they use the equipment?

Identify jobs that could expose workers to falls. Using a set of worksite plans, review the entire construction project. Evaluate each phase of the project from the ground up. Ensure that all walking/working surfaces have the strength to support workers and their equipment. Then identify jobs that could expose workers to falls.

➲ ***A walking/working surface is any surface – horizontal or vertical – on which a person walks or works.***

Identify hazardous work areas. Determine if workers' jobs could expose them to the following hazards:

- Holes in walking/working surfaces that they could step into or fall through
- Elevated walking/working surfaces six feet or more above a lower level
- Skylights and smoke domes that workers could step into or fall through

- Wall openings such as those for windows or doors that workers could fall through
- Trenches and other excavations that are not readily seen and workers could fall into
- Walking/working surfaces from which workers could fall onto dangerous equipment
- Hoist areas where guardrails have been removed to receive materials
- Sides and edges of walking/working surfaces such as established floors, mezzanines, balconies, and walkways that are six feet or more above a lower level and not protected by guardrails at least 39 inches high
- Ramps and runways that are not protected by guardrails at least 39 inches high
- Leading edges — edges of floors, roofs, and decks — that change location as additional sections are added
- Wells, pits, or shafts not protected with guardrails, fences, barricades, or covers

Determine how frequently workers will do jobs that expose them to falls. The more frequently a worker is exposed to a fall hazard, the more likely the worker could fall.

Determine if workers need to move horizontally, vertically, or in both directions to do their jobs. How workers move to perform tasks can affect their risk of falling. Knowing how they move to perform tasks can help you determine how to protect them.

Determine how many workers are exposed to fall hazards. As more workers are exposed to a fall hazard, the more likely it is one could fall.

Identify walking/working surfaces that could expose workers to fall hazards. Examples are floors, roofs, ramps, bridges, runways, formwork, beams, columns, trusses, and rebar.

Identify excavations 6 feet or more in depth that are not readily seen. When an excavation is 6 feet or more in depth and is not readily seen because of plant growth or other visual barrier, use guardrail systems, fences, or barricades to protect any employee who might approach the edge of the visually obstructed excavation.

Identify any well, pit, shaft, or other similar excavations 6 feet or more in depth. Use guardrail systems, fences, barricades, or covers to protect any employee who might approach the edge of a well, pit, shaft, or other similar excavation, when the excavation is 6 feet or more in depth.

Determine the fall distances from walking/working surfaces to lower levels. Generally, workers performing construction activities must be protected from fall hazards on walking/working surfaces where they could fall six feet or more to a lower level. Workers must also be protected from falling onto or into dangerous equipment from any distance. However, there are also situations when the trigger height for fall protection is 10 feet or more.

Ensure that existing guardrails and covers meet Subdivision M requirements.

- Find the requirements for guardrail systems in 1926.502(b).
- Find the requirements for covers in 1926.502(i).

Identify fall hazards that you can eliminate. Eliminating a fall hazard is the most effective fall protection strategy.

Ways to eliminate fall hazards:

- Perform construction work on the ground before lifting or tilting it to an elevated position.
- Install permanent stairs with stairrail system (top rail and midrail or equivalent) early in the project so that workers don't need to use ladders between floors.
- Use tool extensions, whenever possible to allow work to be performed from the ground.

Identify fall hazards that you can't eliminate. If you can't eliminate fall hazards, you must ensure that someone who does fall doesn't die. There are two ways:

- Prevent falls with covers, guardrails, handrails, perimeter safety cables, and personal fall-restraint systems.
- Control falls with personal fall-arrest systems, positioning-device systems, and safety-net systems. Use these fall protection systems only when you can't eliminate fall hazards or prevent falls from occurring.

Consider administrative practices. Administrative practices help prevent falls by influencing the way people work. Examples include using a safe work practice instead of a risky one, training workers how to safely do their jobs, and disciplining those who don't follow safe practices.

Determine if anchorages are necessary. If workers use personal fall-arrest or restraint systems, they need secure anchorages for their lifelines or lanyards. Anchorages for personal fall-arrest systems must be able to support at least 5,000 pounds per attached worker or be designed by a qualified person and have a safety factor of at least two — twice the impact force of a worker free-falling six feet.

Anchorages for personal fall-restraint systems must be able to support at least 3,000 pounds per attached worker or be designed by a qualified person and have a safety factor of at least two — twice the peak anticipated dynamic load.

Table 2: Fall protection trigger heights for construction

Unprotected Walking-Working Surface or Situation	Trigger height			Rule
	Any Height	Six Feet	Ten Feet	
General fall protection		≥		437-003-1501(1)
Holes and skylights (tripping in or stepping into or through)	X			437-003-1501(3)
Wall openings less than 39 inches above walking/working surface		≥		437-003-1501(4)
Excavations not readily seen		≥		437-003-1501(5)(a)
Edge of a well, pit, shaft, and similar excavations		≥		437-003-1501(5)(b)
Walkways over excavations		≥		1926.651(l)
Above dangerous equipment	X			437-003-1501(6)
Scaffolds (supported and suspended)			>	1926.451(g)(1)
Boom supported elevating work platforms	X			1926.451(g)(1)
Vehicle-mounted elevating and rotating work platforms	X			1926.453(b)(2)(v)
Cranes manufactured after Nov. 8, 2011(lattice boom walkways)		≥		437-003-1423(b)(1)
Cranes (assemble, disassemble, or otherwise perform work)			>	437-003-1423(2)
Cranes (hoisting personnel in platform)				1926.1431(k)(10)(i)
Tower cranes (erect, climb, dismantle, or otherwise perform work)			>	437-003-1423(4)
Underground construction (jumbo decks)			>	1926.800(q)(8)(iii)
Power transmission and distribution (climbers)	More than 4 feet			437-002-2306(2)(d)(l)(ii)
Steel erection (general)	More than 15 feet			1926.760(a)(1)
Steel erection (connectors)	*More than two stories or 30 feet			1926.760(b)(1)
Steel erection (Controlled Decking Zone, CDZ)	*More than two stories or 30 feet			1926.760(c)(1)

KEY:

X – Fall protection systems required at any height.

≥ – Fall protection systems required at heights that are more than or equal to the listed height.

> – Fall protection systems required at heights that are more than the listed height.

* – Whichever height is less.

Consider other factors that could increase the risk of falls. Will workers' jobs expose them to overhead power lines? Will they need to use scaffolds, ladders, or aerial lifts on unstable or uneven ground? Will they be working during hot, cold, or windy weather? Consider ergonomics – will workers need to frequently lift, bend, or move in ways that put them off balance? Will they be working extended shifts that could contribute to fatigue?

Summary: Evaluating fall hazards

- Identify tasks that could expose workers to fall hazards.
- Identify all fall hazards in each work area.
- Determine how frequently workers will do tasks that expose them to fall hazards.
- Determine whether workers need to move horizontally, vertically, or in both directions to do their tasks.
- Determine the number of workers exposed to fall hazards.
- Identify walking/working surfaces that could expose workers to fall hazards.
- Determine fall distances from walking/working surfaces to lower levels.
- Ensure that existing guardrails and covers meet Subdivision M requirements.
- Identify fall hazards that you can eliminate.
- Identify fall hazards that you can't eliminate.
- Determine whether anchorages are necessary.
- Consider other factors that could increase the risk of falls.

Incorrect use of this ladder: Do not stand on the second step from the top. Do not use a standard stepladder as a straight ladder.

Part four – Supported access

- What is supported access?
- Portable ladders
- Supported scaffolds
- Aerial lifts

What is supported access?

Portable ladders, supported scaffolds, and aerial lifts let you get to a work area and support you while you work. They make getting to a work area easy, but they can become fall hazards when they are not used properly.

Portable ladders

Portable ladders are versatile, economical, and easy to use. However, workers sometimes use them without thinking about using them safely. Each year, many construction workers in Oregon are injured when they fall from ladders – most fall less than 10 feet.

Photo: Raef Parmelee, Oregon OSHA

Workers sometimes use ladders without thinking about safely using them.

Types of portable ladders. We use ladders to do all sorts of tasks, so it's not surprising that many types of ladders are available. Some commonly used are:

Stepladder. Has flat steps, a hinged back, and is not adjustable. For use only on firm, level surfaces. Available in metal, wood, or reinforced fiberglass. Must have a metal spreader or locking arm and cannot exceed 20 feet. Supports only one worker.

Extension. Offers the most length in a general-purpose ladder. Has two or more adjustable sections. The sliding upper section must be on top of the lower section. Made of wood, metal, or fiberglass. Maximum length depends on material. Supports only one worker.

Platform. Has a large, stable platform near the top that supports one worker. Length cannot exceed 20 feet.

Trestle. Has two sections that are hinged at the top and form equal angles with the base. Used in pairs to support planks or staging. Rungs are not used as steps. Length cannot exceed 20 feet.

Orchard. Has a flared base and a single back leg that provides support on soft, uneven ground. Length cannot exceed 16 feet. The legs lack non-slip feet and the rear leg is not equipped with a locking spreader bar that makes them unsuitable for use on concrete or hard surfaces. Metal and reinforced fiberglass versions are available. Supports only one worker.

➲ ***For more information on portable ladders, please see our publication, Portable ladders: How to use them so they won't let you down.***

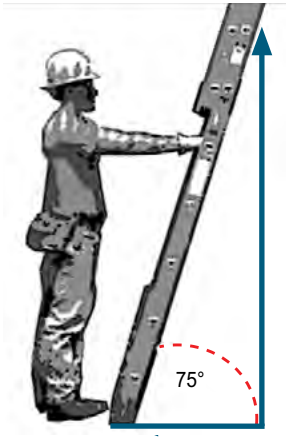
How falls occur. Most workers fall from unstable ladders that shift or tilt when they climb too high or reach too far beyond the side rails. Workers also fall when they slip on rungs while they are climbing or descending and when vehicles strike ladders.

Required training. A competent person must train workers before they use ladders so that they understand the following:

- The nature of the fall hazards in the work area
- How to use, place, and care for ladders
- Maximum intended load-carrying capacities of the ladders
- Oregon OSHA's requirements for the ladders they use

Safe practices. Keep the following in mind when you use a portable ladder:

- Select the appropriate length and type of ladder for the task.
- Inspect the ladder before using it; make sure it's in good condition.
- Angle straight ladders and extension ladders properly with a 4-to-1 slope (height to base).
- Protect the base of a ladder to prevent others from accidentally striking it.
- Select a ladder that will extend at least three feet above the upper level access area or provide a grab rail so that workers can steady themselves as they get on or off. Make sure that the ladder is stable. If the ladder could be displaced by work activities, secure it.
- Face the ladder when you climb and descend it, keeping at least one hand on the ladder.
- Stay within the side rails when climbing and working from the ladder. You can reach out, but keep the rest of your body within the rails.
- Raise and lower heavy loads to and from upper levels with a hand line or a hoist.
- Make sure metal ladders have steps and rungs with skid-resistant surfaces.
- Allow only one person on the ladder. Use a scaffold if two or more people need to work together.
- Never stand on top of a portable ladder.
- Never use ladders that have conductive side rails near exposed, energized equipment.



A 4-to-1 slope is about 75 degrees.

Supported scaffolds

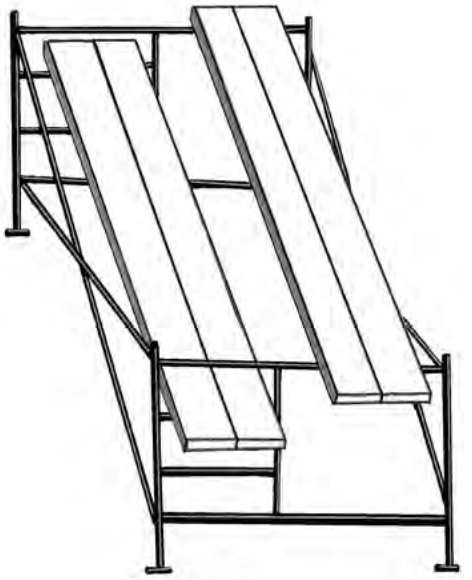
A supported scaffold is simply an elevated platform that has a rigid means of support. Lay a board across a couple of tall buckets, and you have a supported scaffold — but not a safe one.

Most supported scaffolds used for construction work are complex structures and workers must know how to erect them, dismantle them, and work safely from them.

Of the many types of supported scaffolds, fabricated-frame scaffolds are the most common. Like portable ladders, they are versatile, economical, and easy to use. You see them on construction sites as single supported platforms and multiple platforms stacked several stories high on modular frames.

Examples of supported scaffolds:

- Sectional scaffolds
- Fabricated-frame scaffolds
- Tube-and-coupler scaffolds
- Ladder jack scaffolds
- Pump jack scaffolds
- Mast-climbing scaffolds
- Mobile scaffolds
- System scaffolds



Fabricated-frame scaffold

How falls occur. Workers fall from scaffolds when components fail, planks break, handrails give way, and scaffold supports collapse. Not training workers on scaffold setup and use also contributes to many accidents.

When fall protection systems are required. If you work on a supported scaffold more than 10 feet above a lower level, you must be protected from falling. Guardrails at least 42 inches (plus or minus three inches) high are appropriate for most scaffold platforms. If you can't use a guardrail system, then you must use a personal fall-arrest system or restraint system.

➲ ***Guardrails or personal fall-arrest systems are the most common methods for protecting workers from falls.***

Using personal fall-arrest systems. Personal fall-arrest systems must include a lanyard. Attach the lanyard to a vertical lifeline, a horizontal lifeline, or scaffold structural member that will hold at least 5,000 pounds. If you are not sure where to attach a lanyard, get training from a competent person.

Protection for scaffold erectors and dismantlers. Workers must be protected from falling 10 feet or more when they erect or dismantle supported scaffolds if protection is feasible and does not increase the risk of a fall. A competent person must make the determination on a case-by-case basis.

Protection during storms and strong winds. Working from scaffolds is prohibited during storms or strong winds unless a competent person determines that it is safe and the workers use personal fall-arrest systems or are protected by windscreens.

Training for those who work from scaffolds. Workers must be trained to recognize fall hazards and how to eliminate or control them. Training must cover the following:

- Scaffold load capacity and the types of loads appropriate for the scaffold
- When fall protection is required, the appropriate protection to use, and how to use it
- How to use scaffold components
- How to reach access areas
- How to protect those below the scaffold from falling objects
- How to avoid electrical hazards

Fall Hazard! No guardrails. This scaffold has no guardrails and is not fully planked. If you work on a supported scaffold more than 10 feet above a lower level, you must be protected from falling.

Training for scaffold erectors and dismantlers. Those who erect or dismantle scaffolds must have more training from a competent person that covers scaffold hazards, erecting and dismantling procedures, design criteria, and load capacities.

Safe practices. *Keep in mind the following when you use a supported scaffold:*

Getting to the scaffold platform

- Use ladders or stairs to reach platforms that are more than two feet above or below the access point.
- Don't climb cross-braces to reach a scaffold platform.

Loading scaffold platforms

- Scaffolds must be able to support their own weight and at least four times the maximum intended load. The maximum intended load includes workers, equipment, and supplies.
- Platforms must not deflect more than 1/60 of the span when they are loaded.
- Platforms must be fully decked or planked between the front uprights and the guardrail supports.

Using scaffold components

- Make sure a competent person inspects the components before each shift.
- Don't use damaged scaffold components; repair or replace them immediately.
- Don't modify components.
- Scaffold components made by different manufacturers may be mixed, provided they fit together without force and maintain structural integrity.

Minding the environment

- Watch for slippery surfaces. Don't work on platforms covered with snow and ice.
- Stay off scaffolds during storms and strong winds unless a competent person determines that it is safe.
- Keep a safe distance from power lines and any other conductive source. Minimum clearance distances:
  - Uninsulated electrical lines: 10 feet
  - Insulated lines more than 300 volts: three feet
  - Insulated lines less than 300 volts: three feet

Erecting, dismantling, and moving scaffolds

- Scaffolds must be erected, dismantled, or moved only under the supervision of a competent person. The competent person must be on site to direct and supervise the work.
- Only trained, experienced persons selected by the competent person may do the work.
- Never use wood outriggers to support a scaffold.
- Don't use bricks, blocks, barrels, or other unstable objects to level a scaffold.
- Don't use makeshift methods to increase the working height of a scaffold platform.

Protecting workers from falling objects

- If tools, materials, or equipment could fall from a scaffold, the area below must be barricaded or the scaffold must have toeboards or screens.
- Don't throw anything from a scaffold.

Inspecting scaffolds

- Inspect regularly components, connections, planks, and structures.
- Keep the scaffold level, plumb, and square.

Never use bricks or blocks to level a scaffold.

Aerial lifts

Aerial lifts are designed to position workers and handle materials when a work surface is not easy to reach.

Types of lifts. Most aerial lifts have extensible or articulating mechanisms that can position workers up, down, or sideways.The American National Standards Institute (ANSI) defines and sets operating standards for four different types of aerial lifts:

- Vehicle-mounted elevating and rotating lifts (ANSI A92.2 devices)
- Manually propelled elevating work platforms (ANSI A92.3 devices)
- Boom-supported elevating work platforms (ANSI A92.5 devices)
- Self-propelled elevating work platforms and scissor lifts (ANSI A92.6 devices)

How falls occur. Most accidents involving aerial lifts can be traced to untrained or improperly trained workers. Reasons for falls:

- Outriggers are not used or improperly placed and the lift vehicle overturns.
- Workers are not tied off while they are in the bucket.
- Workers fall or are pulled off the platform when the lift is struck by a vehicle or moves unexpectedly.
- A hydraulic cylinder fails and causes the boom to drop.

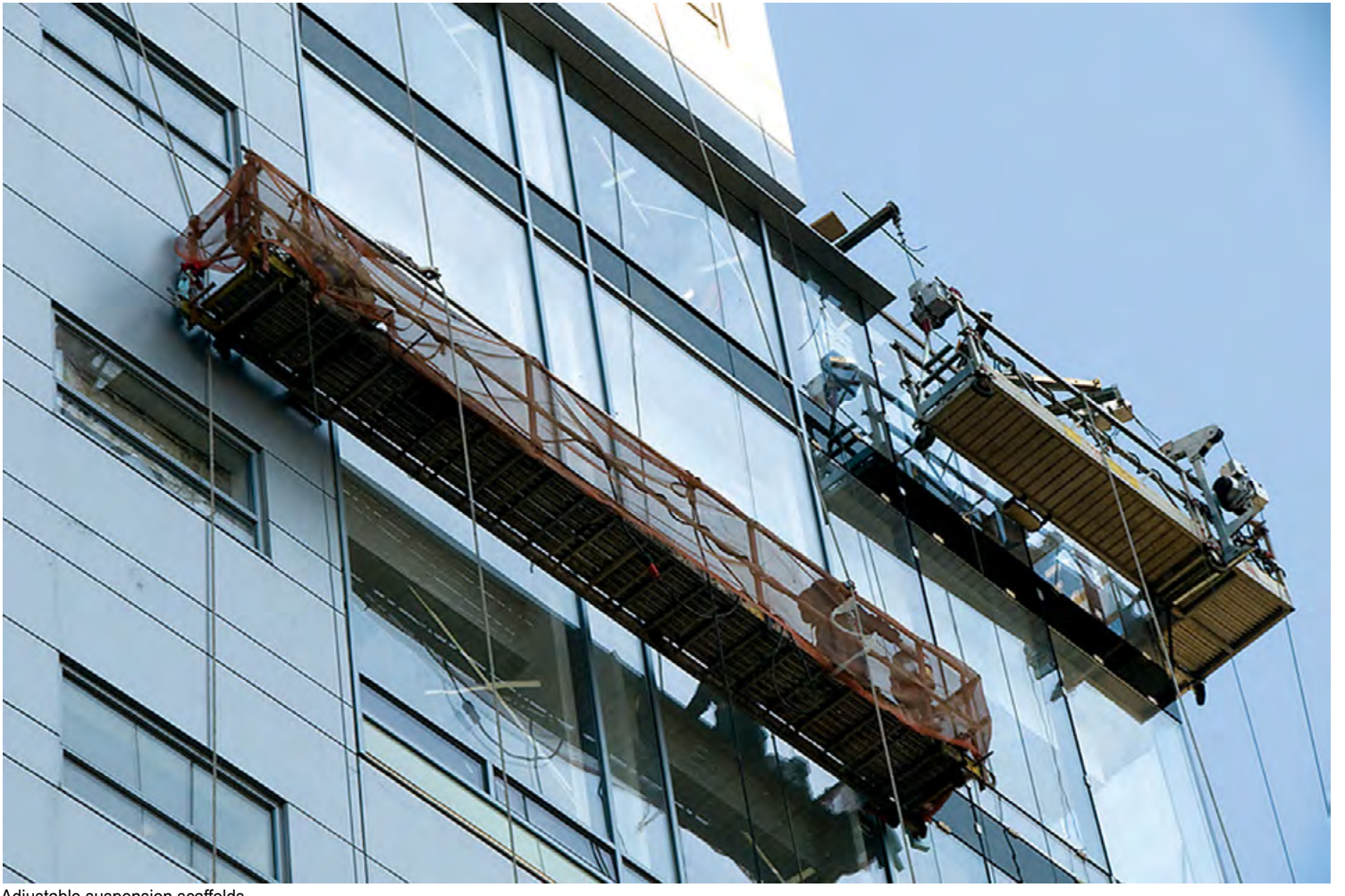
Appropriate fall protection. If you work from an aerial lift, you must be protected from falling. The type of fall protection you need depends on the type of lift you use, summarized in Table 3.

If you work from an aerial lift, you must be protected from falling.

Table 3: Fall protection for aerial lifts
Vehicle mount elevating and rotating lifts [ANSI A92.2 devices] • Platforms other than buckets or baskets must include guardrail systems with guardrails, midrails, and toeboards. • Each worker who works on a boom-supported platform must use a personal fall-arrest system, or a fall-restraint system that is rigged in such a way that the worker cannot get to the fall hazard.
Manually propelled elevating work platforms [ANSI A92.3 devices] The platform must have a guardrail 42 inches (plus or minus three inches) high, a midrail, and toeboards at least four inches high.
Boom-supported elevating work platforms [ANSI A92.5 devices] • The platform must have a guardrail 42 inches (plus or minus three inches) high, a midrail, and toeboards at least four inches high. • Each worker on the platform must use a personal fall-arrest system, or a fall-restraint system that is rigged in such a way that the worker cannot get to the fall hazard.
Self-propelled elevating work platforms and scissor lifts [ANSI A92.6 devices]

Safe practices. Keep in mind the following when you use an aerial lift:

- Use the lift only for its intended purpose and follow the manufacturer's instructions.
- Keep the operating manual with the lift.
- Keep the lift level and stable; use outriggers and intermediate stabilizers.
- Never move the lift when the boom is up and workers are on the platform, unless allowed by the manufacturer.
- Stand on the platform floor. Don't sit, stand, or climb on the edge of the basket, top rail, or midrail.
- Be sure to close the access gate while you are working from the platform.
- Inspect the lift before using it to make sure that it is working properly and it is in good condition.
- Know the lift's rated load capacity and don't exceed it.
- Stay at least 10 feet away from electrical power lines.
- Never use the lift during severe weather.
- Use warning signs or barricades to keep others out of the work area.
- Never tie off to other equipment or to a structure next to the platform.



Adjustable suspension scaffolds.

Part five – Suspended access

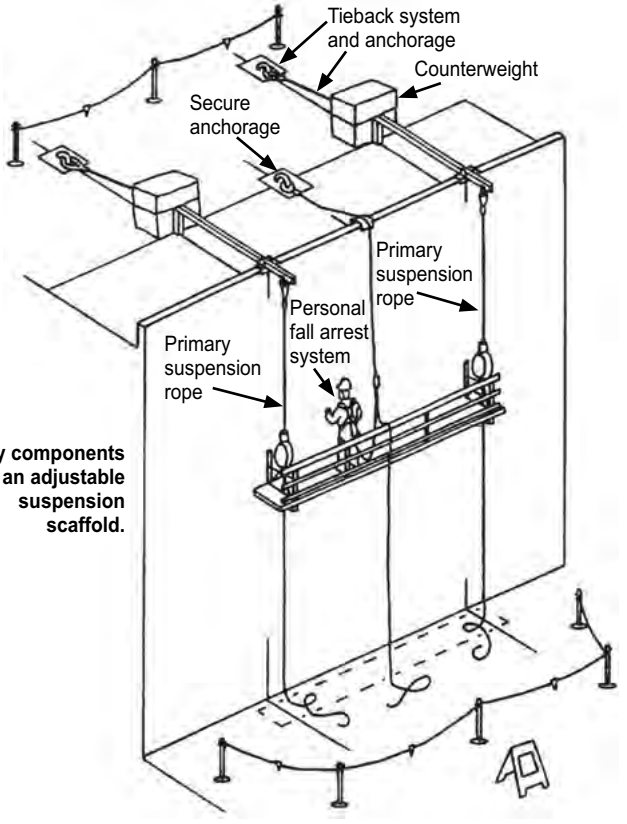
- What is suspended access?
- Adjustable-suspension scaffolds
- Crane- and derrick-suspended personnel platforms

What is suspended access?

Portable ladders, supported scaffolds, and aerial lifts provide easy access to most elevated work areas. When they are not feasible or safe, however, the alternative is a suspended platform.

Suspended access is a means of getting to difficult-to-reach work areas on a suspended platform. Usually the platform is an adjustable-suspension scaffold. The scaffold, typically suspended by wire rope from a rooftop anchor, has a hoist that workers use to reach the work area.

In some cases, however, even adjustable-suspension scaffolds may not be feasible or safe. When there is no other safe way to reach the work area, a crane or derrick can provide suspended access by hoisting a personnel platform to reach the work area.



Key components of an adjustable suspension scaffold.

Adjustable-suspension scaffolds

A suspension scaffold is a temporary elevated platform that hangs by wire rope. Add a hoist to move the platform up or down, and you have an adjustable-suspension scaffold, but not necessarily a safe one. Suspension ropes, lifelines, platforms, hoists, overhead support devices, and tieback systems are critical to the safety of adjustable-suspension scaffolds. Basic types of adjustable-suspension scaffolds:

Single-point adjustable scaffolds. A single-point suspension scaffold is suspended by a single wire rope from an overhead support device such as a davit or outrigger beam. The platform is usually ground rigged.

A **boatswain's chair**, the most common single-point suspension scaffold, supports only one worker in a sitting position. The chair is lightweight, easy to rig, and favored by window cleaners. Most chairs are equipped with descent-control devices.

Two-point adjustable-suspension scaffolds. Also known as swing-stage scaffolds, these scaffolds are suspended by two independent ropes from an overhead support device such as a davit or outrigger beam. They are used by window cleaners on skyscrapers and by construction workers on high-rise projects.

Multipoint adjustable-suspension scaffolds. As the name suggests, these scaffolds are suspended by more than two independent ropes. They are often used for chimney cleaning and are called chimney hoists.

How falls occur from adjustable-suspension scaffolds. Most accidents involving adjustable-suspension scaffolds happen when a primary suspension rope breaks. Workers can die during such events if they don't use personal fall-arrest systems or they incorrectly use them. Steel suspension ropes rarely break if they are correctly rigged, maintained, and inspected regularly. When the ropes aren't maintained, they weaken. If an ascending platform snags, an electric hoist that continues to operate can easily snap a weak rope. Pressure from the two steel discs that clamp to the support rope in sheave-type hoist motors can also break a weak rope.

Failing anchors also cause serious accidents. Too often, untrained workers attach lifelines and suspension ropes to "secure-looking" rooftop fixtures for convenience. These anchors fail because they are not designed to support suspended loads.

Lifelines can fail when workers hang them over unpadded edges, don't inspect them, or use ropes not designed for personal fall-arrest systems.

Using adjustable-suspension scaffolds. Before you use an adjustable-suspension scaffold, you need to know the engineering principles for anchoring and suspending the scaffold, how to rig the scaffold, how to operate the hoist, how to work safely from the scaffold, and what to do in an emergency.

A competent person must examine all direct connections that are part of the system and confirm that the connections will support the platform loads. You must also wear a personal fall-arrest system to protect yourself if a connection fails.

Newer buildings and renovated buildings usually have some form of support system for suspension scaffolds. However, older buildings, buildings with large cornices, and tiered buildings often lack adequate support for suspended platforms. If you are not sure, have a qualified person determine whether it is safe to use an adjustable-suspension scaffold on these buildings.

When fall protection systems are required. If you work on an adjustable-suspension scaffold more than 10 feet above a lower level, you must be protected from falling with an appropriate fall protection system.

- **Single-point and two-point adjustable-suspension scaffolds:** Personal fall-arrest systems and guardrail systems are required on single-point or two-point adjustable-suspension scaffolds. The top edge of guardrail must be between 36 inches and 45 inches above the platform surface. (The top edge can exceed 45 inches when necessary.)
- **Boatswain's chairs:** Personal fall-arrest systems are required for workers who use boatswain's chairs.
- **Multipoint adjustable-suspension scaffolds:** Personal fall-arrest systems and guardrail systems are required on multipoint adjustable-suspension scaffolds. The top edge of the guardrail must be between 36 inches and 45 inches above the platform surface. (The top edge can exceed 45 inches, when necessary.)

Required training. Those who work from adjustable-suspension scaffolds must be trained to recognize fall hazards and to control or minimize the hazards. Training must cover the following topics:

- Scaffold load capacity and the types of loads appropriate for the scaffold
- When fall protection is required, the appropriate protection to use, and how to use it
- How to use scaffold components
- How to reach access areas
- How to protect those below the scaffold from falling objects
- How to avoid electrical hazards

Training for scaffold erectors and dismantlers. If you erect or dismantle scaffolds, you must have additional training by a competent person that covers scaffold hazards, erecting and dismantling procedures, design criteria, and load capacities.

Table 4: Safe practices for working from adjustable-suspension scaffolds
Getting on the scaffold platform. Most workers get on a suspended scaffold from a roof or from the ground and then raise or lower the platform to the work area. Use a ladder if the distance between the access point and the scaffold platform is more than two feet.
Using support devices. Support devices must rest on surfaces that can support at least four times the scaffold load when the scaffold operates at the hoist's rated load, or at least 1.5 times the scaffold load when it is operating at the hoist's stall load, whichever is greater. Examples: outriggers, parapet clamps, and cornice hooks.
Using outriggers. Outriggers are the horizontal beams that support suspension scaffolds. They must be made of structural metal or equally strong material and must be permanently attached to a roof or stabilized by counterweights and secured by tiebacks.
Using parapet clamps. A parapet is the wall that surrounds the edge of a roof. A parapet clamp is a temporary anchor for a suspension rope, lifeline, or tieback line. Window washers use parapet clamps to suspend boatswain's chairs. Unreinforced parapet walls, precast concrete walls, and masonry walls will not meet the minimum load requirement for support devices.
Using cornice hooks. A cornice hook is a temporary anchor for a suspension rope. A cornice hook should be installed so that the load from the suspended equipment pulls vertically downward. ➲ ***Don't use a cornice hook as a lifeline or tieback anchor.***

Using counterweights. Use counterweights only to stabilize outriggers and offset the weight of the scaffold. Don't change or move them until the scaffold is dismantled. Flowable materials such as sand, gravel, and similar materials that can be easily dislocated cannot be used as a counterweight. Solid materials designed as counterweights, such as concrete or lead blocks, are acceptable.

Using tiebacks. Tiebacks prevent outrigger beams from moving and provide secondary support for a suspended scaffold. They must be at least as strong as suspension ropes and must be secured to a structurally sound anchor. Never use standpipes, vents, other piping systems, or electrical conduit for anchorages.

- Install tiebacks perpendicular to the face of the building or structure or use opposing angle tiebacks.
- Support devices such as cornice hooks, roof hooks, or parapet clamps must also be secured by properly installed tiebacks.

Using suspension rope. A competent person must inspect suspension ropes before each shift. Immediately replace damaged rope with new rope. Never use repaired rope.

- Suspension rope must be one continuous length. Wire suspension ropes can be joined only with eye-splice thimbles connected with shackles or cover plates and bolts.
- Don't use swaged attachments or spliced eyes on wire rope unless the manufacturer or a qualified person made them.

➲ ***Keep suspension ropes away from heat and acids or other corrosive substances.***

Using hoists. Never use gasoline-powered hoists on suspension scaffolds.

- Hoists must have an operating brake and an automatic braking device or locking pawl that engages if the operating speed changes suddenly.
- There must be at least four wraps of suspension rope on a winding drum hoist when the scaffold is at its lowest point. On all other hoists, the suspension rope must be long enough that the scaffold can be lowered without the rope end passing through the hoist.

Securing scaffolds. Secure two-point and multipoint scaffolds if they could sway while workers are on them; a competent person must make the determination. Window cleaners' anchors cannot be used to secure suspension scaffolds.

Using tag lines. If it is possible for a swinging load to strike the scaffold, use tag lines to control the load.

What you should know about descent-control devices. A descent-control device lets you descend a primary support rope — typically from a boatswain's chair — then lock the device when you reach the work area. The device works by friction, engaging the support rope and controlling descent speed. Most workers start from the roof and work down the face of the building. When they reach the ground, they remove the descent equipment from the support rope and return to the roof for another drop.

How falls occur. Most falls happen when the primary support rope or a supporting anchor fails – not the descent device. Support ropes fail because workers don't regularly inspect them or they misuse them. Anchors fail when workers simply assume they are secure. Descent devices, support ropes, and anchors rarely fail when workers know how to use them.

Oregon OSHA requirements. Oregon OSHA does not have specific requirements for descent-control devices. However, you should follow the manufacturer's instructions and be trained by a competent person.

Safe practices for descent-control devices:

- Know how to use the equipment.
- Inspect the equipment daily.
- Rig suspension ropes and support devices properly.
- Use an independently anchored personal fall-arrest system.
- Ensure that primary support ropes and lifelines will support at least 5,000 pounds.
- Don't use primary support ropes and lifelines that are worn or damaged.
- Protect primary support ropes and lifelines that contact surface edges.
- Protect primary support ropes and lifelines from extreme temperatures and corrosive chemicals.
- Understand self-rescue procedures and techniques.
- Don't use descent-control devices in strong winds.

Crane- and derrick-suspended personnel platforms

Sometimes, workers may not be able to reach the work area with stairways, ladders, scaffolds, or aerial lifts. When there is no other safe way to reach the area, you can use a crane or a derrick and a personnel platform to lift workers to the area.

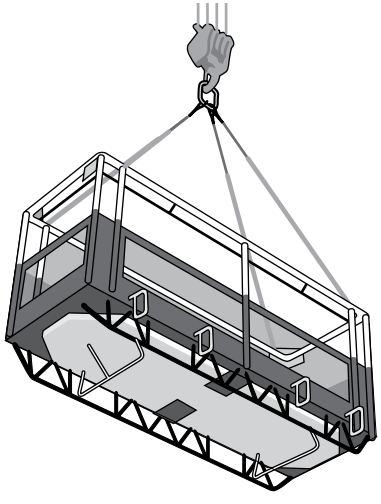
Employee safety must be the basis for your decision to use this method. [See Subdivision CC, *Cranes and Derricks in Construction*, 1926.1431 (Hoisting Personnel) for more information.]

How injuries occur. Workers rarely fall from suspended personnel platforms. Most incidents occur when the boom or another part of the crane contacts an energized power line. Other causes of serious incidents include:

- Instability. Unstable ground or support surface causes the crane to tip over.
- Lack of communication. The crane operator can't see the suspended platform while it is moving.
- Rigging failure. Platform loads are not properly rigged.
- Boom failure. The weight of the loaded platform exceeds the boom's load limit.

Safe practices for riding personnel platforms to the work area:

- Conduct a pre-lift meeting to review the applicable requirements of 1926.1431 and the procedures that will be followed.
- Conduct a trial lift with the unoccupied platform loaded at least to the anticipated lift weight from where employees will enter the platform to each location at which the platform is to be hoisted and positioned.
- Conduct a visual inspection of the equipment, base support or ground, and personnel platform to determine if the trial lift has exposed any problem or produced any adverse effect.
- Stay within the platform while it is moving and use a fall arrest system with the lanyard connected to a structural member of the platform.
- Stay in view of the crane operator or signal person while you are on the platform.
- Before leaving the platform for the work area, secure it to the structure.



A crane-suspended personnel platform

Photo: Steve Clark/Laborers/elcoshimages.org

Assembling guardrails. Worker at leading edge tied off to a retractable lanyard.

Part six – Preventing and controlling falls

- What is a fall protection system?
- What to consider when selecting a fall protection system
- Personal fall-arrest systems
- Personal fall-restraint systems
- Positioning-device systems
- Guardrail systems
- Safety-net systems
- **Warning lines for non-roofing construction acitivities**
- **Safety monitoring for roofing work**
- Catch platforms
- Covers for holes
- Fences and barricades
- Protecting workers from falling objects

What is a fall protection system?

A fall protection system is designed to prevent falls or control them so that someone who does fall doesn't die. If workers will be exposed to fall hazards that you can't eliminate, you need to protect them with one of the fall protection systems shown in Table 5.

Table 5: Fall protection systems

Type of fall protection system	What it does
Personal fall-arrest system	Controls (arrests) a fall
Personal fall-restraint system	Prevents a fall
Positioning-device system	Positions a worker and limits a fall to two feet
Guardrail system	Prevents a fall
Safety-net system	Controls (arrests) a fall
Warning line	Warns a worker of a fall hazard

Other fall protection methods. The following methods may also be appropriate for preventing falls:

- Safety monitoring for roofing work. A method in which a person — rather than a mechanical system — warns roofers when they are in danger of falling. The monitor, who must be a competent person, is responsible for recognizing the hazards and warning workers about them.
- Catch platforms. Though not covered in Subdivision M, catch platforms, which consist of a stable platform and an attached standard guardrail, can protect workers when other systems or methods are not feasible.
- Covers for holes. Simple and effective when they are capable of supporting, without failure, at least twice the weight of employees, equipment, materials that may be imposed on the cover at one time, and are properly installed. Rigid covers prevent workers from falling through temporary holes, openings, and skylights in walking/working surfaces.
- Fences and barricades. Use a fence or similar barricade to keep people away from wells, pits, and shafts.

What to consider when selecting a fall protection system

Appropriate fall protection systems have the following characteristics:

- They are affordable.
- They offer the least interference with workers' tasks or activities.
- They prevent falls or protect workers who do fall.

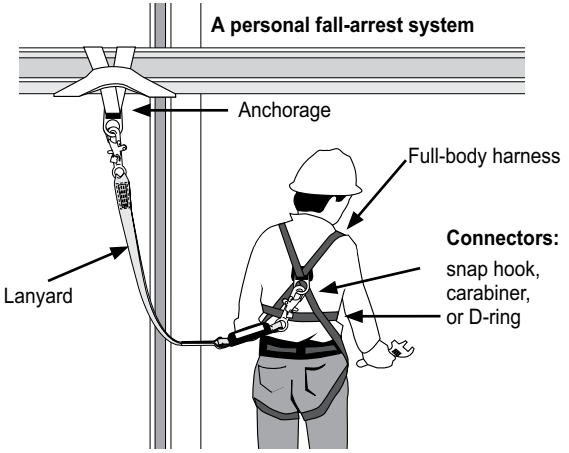
Wherever possible, eliminate fall hazards. Identify hazards that you can't eliminate and evaluate each one. The evaluation will help you determine appropriate fall protection systems for your work site. Consider the following:

- What is the fall distance from the walking/working surface to the next lower level?
- How many workers are exposed to the hazard?
- What tasks and work areas are associated with the hazard?
- How will the workers move — horizontally, vertically, or in both directions — to do their tasks?
- Are secure anchorages available or can they be easily installed near the hazard?
- Are there other hazards near the work area, such as overhead power lines?
- How will workers be promptly rescued if they are suspended in a personal fall-arrest system?

Personal fall-arrest systems

A personal fall-arrest system consists of an anchorage, connectors, and a full-body harness that work together to stop a fall and to minimize the arrest force. Other parts of the system may include a lanyard, a deceleration device, and a lifeline. The personal fall-arrest system is effective only if you know how all of the components work together to stop a fall. Before you use a personal fall-arrest system, you should know the following:

- How to select and install a secure anchorage
- How to select and use connectors
- How to put on and use a full-body harness
- How to correctly attach and use a lanyard
- When a deceleration device is necessary
- How to erect and use a lifeline
- The correct procedures for using retractable devices
- How to estimate fall distances
- How to avoid swing falls
- How to inspect and maintain the system
- How you will be promptly rescued if you fall



The anchorage. An anchorage is a secure point of attachment for lifelines, lanyards, or deceleration devices. An anchorage for a personal fall-arrest system must support at least 5,000 pounds. Anchorages that can't support 5,000 pounds must be designed and installed under the supervision of a qualified person and must be able to maintain a safety factor of at least two — twice the impact force of a worker free-falling six feet. If you don't know how much weight an anchorage will support, have a qualified person check it before you trust your life to it.

➲ ***Anchorage strength is critical, but is not the only factor to consider.*** **Also important:**

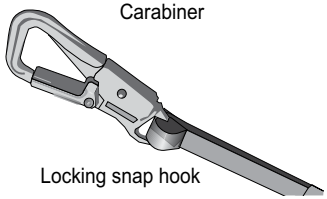
- *Anchorage connector.* Unless an existing anchorage has been designed to accept a lanyard or lifeline, you need to attach an anchorage connector — a device that provides a secure attachment point. Examples include tie-off adapters, hook anchors, beam connectors, and beam trolleys. Be sure that the connector is compatible with the lanyard or lifeline and appropriate for the work task.
- *Attachment point.* The anchorage can be used only as the attachment point for a personal fall-arrest system; it can't be used to support or suspend platforms.

- *Location.* The anchorage should be located directly above the worker, if possible, to reduce the chance of a swing fall.
- *Fall distance.* Because a personal fall-arrest system doesn't prevent a fall, the anchorage must be high enough above a worker so that the arrest system, rather than a lower level, stops the fall. Consider free-fall distance, lanyard length, shock-absorber elongation, and body-harness stretch in determining the height of an anchorage.

➲ ***Free-fall distance is the distance a worker falls before a personal fall-arrest system begins to stop the fall.***

Connectors. An anchorage, a lanyard, and a body harness are not useful until they are linked together. Connectors do the linking; they make the anchorage, the lanyard, and the harness a complete system. Connectors include carabiners, snap hooks, and D-rings.

Carabiner



Locking snap hook

- *Carabiner.* This high-tensile alloy steel connector has a locking gate and is used mostly in specialized work such as window cleaning and high-angle rescue. Carabiners must have a minimum tensile strength of 5,000 pounds.
- *Snap hook.* A hook-shaped member with a keeper that opens to receive a connecting component and automatically closes when released. Snap hooks are typically spliced or sewn into lanyards and self-retracting lifelines. Snap hooks must be high-tensile alloy steel and have a minimum tensile strength of 5,000 pounds.

➲ ***Use only locking snap hooks with personal fall-arrest systems; locking snap hooks have self-locking keepers that won't open until they are unlocked.***

- *D-ring.* D-rings are the attachment points sewn into a full-body harness. D-rings must have a minimum tensile strength of 5,000 pounds.

The full-body harness. The full-body harness has straps that distribute the impact of a fall over the thighs, waist, chest, shoulders, and pelvis. Full-body harnesses come in different styles, many of which are light and comfortable. Before you purchase harnesses, make sure that they fit those who will use them, they're comfortable, and they are easy to adjust.

➲ ***A full-body harness should include a back D-ring for attaching lifelines or lanyards and a back pad for support.***

➲ ***Never use a body belt as part of a personal fall-arrest system.***

Keep the following in mind when you buy a full-body harness:

- The harness must be made from synthetic fibers.
- The harness must fit the user. It should be comfortable and easy to adjust.
- The harness must have an attachment point, usually a D-ring, in the center of the back at about shoulder level. The D-ring should be large enough to easily accept a lanyard snap hook.
- Chest straps should be easy to adjust and strong enough to withstand a fall without breaking.
- Use only industrial full-body harnesses (not recreational climbing harnesses).
- The harness must be safe and reliable. It should meet ANSI and CSA standards and the manufacturer should have ISO 9001 certification, which shows the manufacturer meets international standards for product design, development, production, installation, and service.

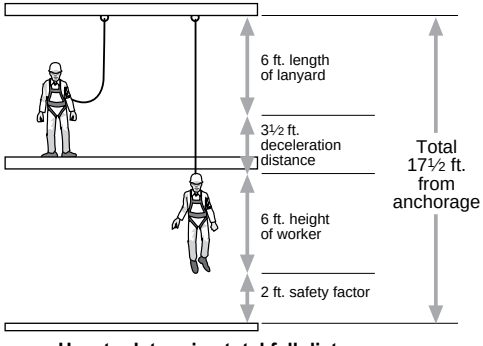
Lanyards. A lanyard is a specially designed flexible line that has a snap hook at each end. One snap hook connects to the body harness and the other connects to an anchorage or a lifeline. Lanyards must have a minimum breaking strength of 5,000 pounds. They come in a variety of styles, including self-retracting types that make moving easier and shock-absorbing types that reduce fall-arrest forces.

➲ ***Don't combine lanyards to increase length or knot them to make them shorter.***

Deceleration devices. Deceleration devices protect workers from the impact of a fall and include shock-absorbing lanyards, self-retracting lifelines or lanyards, and rope grabs.

Shock-absorbing lanyard. A shock absorber reduces the impact on a worker during fall arrest by extending up to 3.5 feet to absorb the arrest force. Subdivision M rules limit the arrest force to 1,800 pounds but a shock-absorbing lanyard can reduce the force even more — to about 900 pounds.

Because a shock-absorbing lanyard extends up to 3.5 feet, it is critical that the lanyard stops the worker before the next lower level. Allow about 20 vertical feet between the worker's anchorage point and the level below the working surface. Always calculate the total distance of a possible fall before using a shock-absorbing lanyard. *Consider the following example:*



How to determine total fall distance with a shock-absorbing lanyard.

➲ ***How to calculate total fall distance: Lanyard length (6 feet) + deceleration distance (3.5 feet) + worker's height (6 feet) + safety margin (2 feet) = 17.5 vertical feet from anchorage to lower level.***

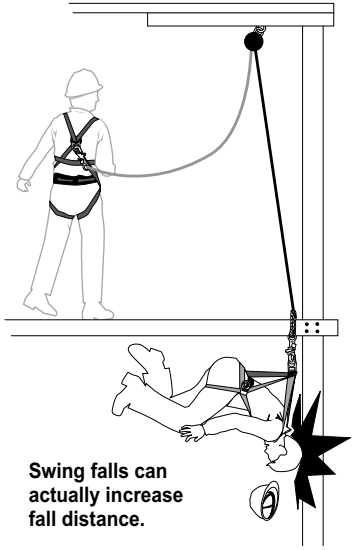
- ***Never use a shock-absorbing lanyard if the shock absorber is even partially extended or if the lanyard has arrested a fall.***

Self-retracting lanyards or lifelines. Self-retracting lanyards and lifelines offer more freedom to move than shock-absorbing lanyards. Each has a drum-wound line that unwinds and retracts as the worker moves. If the worker falls, the drum immediately locks, which reduces free-fall distance to about two feet — if the anchorage point is directly above the worker. Some self-retracting lanyards will reduce free-fall distance to less than one foot. Self-retracting lanyards are available in lengths up to 20 feet. Self-retracting lifelines, which offer more freedom, are available in lengths up to 250 feet.

- ***Self-retracting lanyards and lifelines that limit free-fall distance to two feet or less must be able to hold at least 3,000 pounds with the lanyard (or lifeline) fully extended.***
- ***Self-retracting lanyards that don't limit free-fall distance to two feet must be able to hold at least 5,000 pounds with the lanyard (or lifeline) fully extended.***
- ***Beware of swing falls!*** *If you use a self-retracting lanyard or lifeline, work below the anchorage to avoid a swing fall. The farther you move away from the anchorage, the farther you will fall and the greater your risk of swinging back into a hard object. Swing falls are hazardous because you can hit an object or a lower level during the pendulum motion.*

Rope grab. A rope grab allows a worker to move up a vertical lifeline but automatically engages and locks on the lifeline if the worker falls. When using a rope grab, keep the following in mind:

- The rope grab must be compatible with the lifeline.
- The rope grab must be correctly attached to the lifeline (not upside down).
- Keep the lanyard (between the rope grab and the body harness) as short as possible.
- Keep the rope grab as high as possible on the lifeline.



Swing falls can actually increase fall distance.

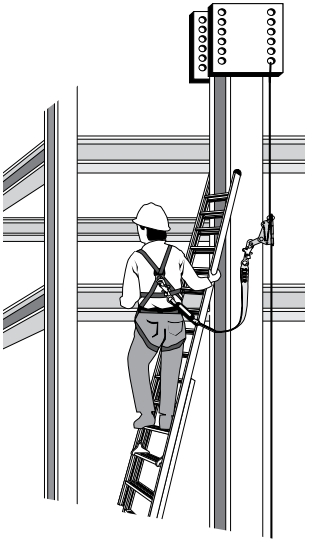
Lifeline. A lifeline is a cable or rope that connects to a body harness, lanyard, or deceleration device, and at least one anchorage. There are two types of lifelines, vertical and horizontal.

Vertical lifeline. A vertical lifeline is attached to an overhead anchorage and must be connected directly to a worker's full-body harness, lanyard, retractable device, or rope grab; it must have a minimum breaking strength of 5,000 pounds.

When a worker needs to move horizontally, however, a vertical lifeline can be hazardous due to the potential for a *swing fall* — the pendulum motion that results when the worker swings back under the anchor point. A swing fall increases a worker's risk of striking an object or a lower level during the pendulum motion.

Horizontal lifeline. Unlike a vertical lifeline, the horizontal lifeline stretches between two anchorages. When you connect a lanyard or rope grab to a horizontal lifeline, you can move about freely, thus reducing the risk of a swing fall. However, horizontal lifelines are subject to much greater loads than vertical lifelines. Horizontal lifelines can fail at the anchorage points if they're not installed correctly. For this reason, horizontal lifelines must be designed, installed, and used under the supervision of a qualified person.

Horizontal lifelines and sag angles. Any load on a horizontal lifeline will cause it to deflect or sag. The sag angle is a horizontal lifeline's angle of deflection when it is subjected to a load, such as a falling worker. Reducing the sag angle (making a horizontal lifeline too tight) actually increases the force on the line during a fall. As you tighten a horizontal lifeline, you dramatically increase the impact load! For example, when the sag angle is 15 degrees, the force on the lifeline and anchorages subjected to a load is about 2:1. However, if you decrease the sag angle to five degrees, the force increases to about 6:1.



This worker is attached to a vertical lifeline with a lanyard and rope grab. The lifeline was anchored to the top of the column while it was on the ground.

To reduce loads on a horizontal lifeline, increase the sag angle or connect to the lifeline with a shock-absorbing lanyard.

Safe practices for personal fall-arrest systems

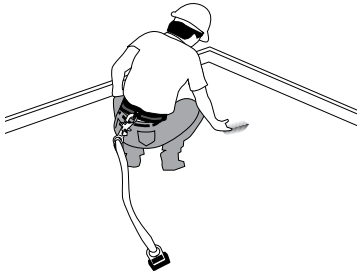
- Don't tie knots in rope lanyards and lifelines; knots can reduce strength by 50 percent.
- Don't tie lifelines or lanyards directly to I-beams; the cutting action of beam edges can reduce the rope's strength by 70 percent.
- Know how the sag angle of a horizontal lifeline affects arrest forces on the anchorages.
- Remember, horizontal lifelines must be designed, installed, and used under the supervision of a qualified person.

- Think about the potential for a swing fall whenever you connect a lifeline to a personal fall-arrest system.
- Remember, a shock-absorbing lanyard will elongate before arresting a fall. The fall distance includes lanyard length (before the shock absorber extends), deceleration distance (shock-absorber extension), worker height, and a safety margin (allow two feet).

Personal fall-restraint systems

Unlike the personal fall-arrest system, which is designed to stop a fall, a personal fall-restraint system prevents a worker from reaching an unprotected edge and thus prevents a fall from occurring. The system consists of an anchorage, connectors, and a body harness or a body belt. The attachment point to the body belt or full-body harness can be at the back, front, or side D-rings.

The anchorage for a fall-restraint system must support at least 3,000 pounds or be designed and installed by a qualified person and have a safety factor of at least two.



A fall-restraint system

Positioning-device systems

Positioning-device systems make it easier to work with both hands free on a vertical surface such as a wall or concrete form. Positioning-device systems are also called Class II work-positioning systems and work-positioning systems.

A positioning-device system with self-retracting lifeline

The components of a positioning-device system — anchorage, connectors, and body support — are similar to those of a personal fall-arrest system. However, the systems serve different purposes. A positioning-device system provides support and must stop a free fall within two feet; a personal-fall-arrest system provides no support and must limit free-fall distance to six feet.

Anchorage. Positioning-device systems must be secured to an anchorage that can support at least twice the potential impact of a worker's fall or 3,000 pounds, whichever is greater.

Connectors. Connectors must have a minimum strength of 5,000 pounds. Snap hooks and D-rings must be proof-tested to a minimum load of 3,600 pounds without deforming or breaking.

Body support. A body belt is acceptable as part of a positioning-device system. However, it must limit the arresting force on a worker to 900 pounds and it can be used only for body support. A full-body harness is also acceptable but must limit the arrest force to 1,800 pounds. Belts or harnesses must have side D-rings or a single front D-ring for positioning.

Guardrail systems

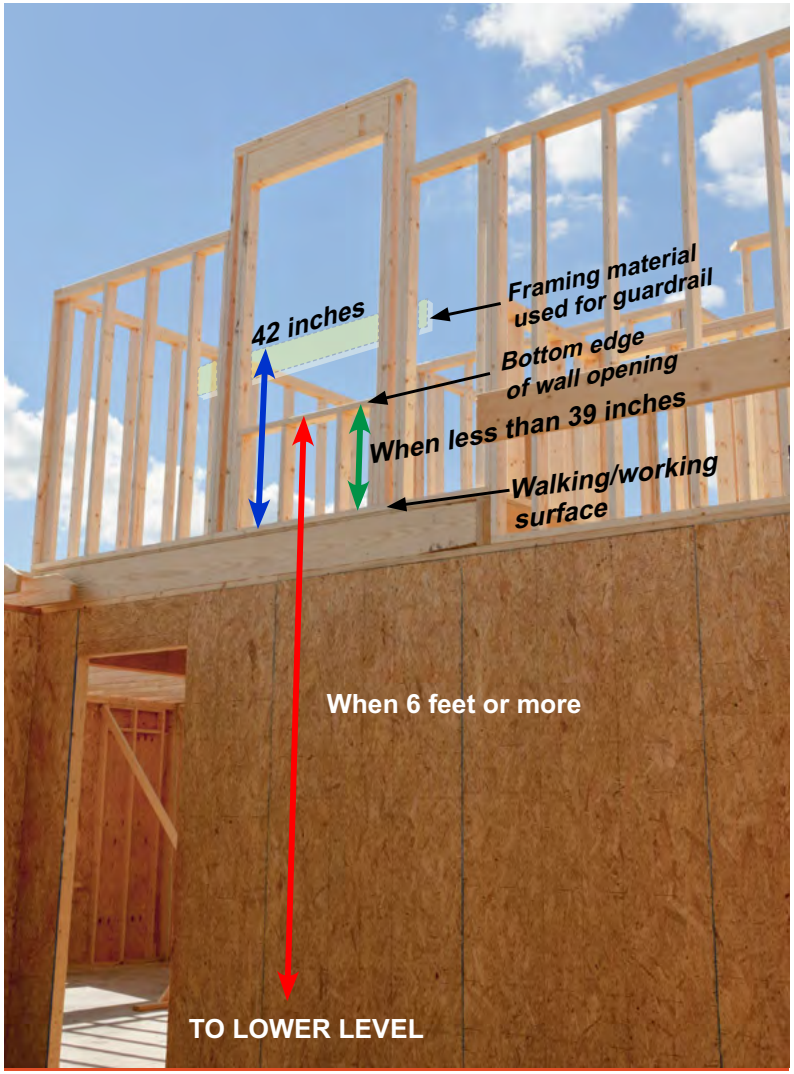
A guardrail system consists of a top rail, midrail, and intermediate vertical members. Guardrail systems can also be combined with toeboards that prevent materials from rolling off the walking/working surface.

Guardrail systems must be free of anything that might cut a worker or snag a worker's clothing. Top rails and midrails must be at least 1/4-inch thick to reduce the risk of hand lacerations; steel and plastic banding cannot be used for top rails and midrails. Other requirements for guardrails:

- Wire rope used for a top rail must be marked at least every six feet with high-visibility material.
- The top rail of a guardrail must be 42 inches (plus or minus three inches) above the walking/working surface. The top-edge height can exceed 45 inches if the system meets all other performance criteria.
- Midrails must be installed midway between the top rail and the walking/working surface unless there is an existing wall or parapet at least 21 inches high.
- Screens and mesh are required when material could fall between the top rail and midrail or between the midrail and the walking/working surface.
- Intermediate vertical members, when used instead of midrails between posts, must be no more than 19 inches apart.
- A 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 of force applied in any downward or outward direction.

Photo credit: Scott Collins, Time Frame Inc.

Temporary guardrail systems make it easy to protect workers.



Wall openings

Each employee working on, at, above, or near wall openings (including those with chutes attached) where **the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface** and **the outside bottom edge of the wall opening is six feet or more above lower levels**, must be protected from falling by the use of guardrail systems, safety net systems, personal fall arrest systems, or personal fall restraint systems.

A simple method to protect employees from falling through such wall openings is to use available framing material as a guardrail that is capable of withstanding, without failure, a force of at least 200 pounds in any outward or downward direction, at any point along the top edge. **The top edge height of the top rail must be 42 inches (plus or minus three inches) to the walking/working surface.** If the bottom edge of the wall opening is less than 21 inches from the walking/working surface, a midrail must also be installed.

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

Safety-net systems

Safety-net systems consist of mesh nets and connecting components.

- Safety-net openings can't be more than six inches on a side, center to center.
- Safety nets must not be installed more than 30 feet below the working surface.
- An installed net must be able to withstand a drop test consisting of a 400-pound sandbag, 30 inches in diameter, dropped from the working surface.
- Inspect safety nets regularly and remove debris from them no later than the start of the next work shift.

The minimum horizontal distance to the net's outer edge depends on how far below the working surface the net is placed, as shown in Table 6.

A safety-net system

Photo: mountsinai/CHEP/elcoshimages.org

Table 6: Minimum horizontal distance from the edge of the working surface to the net's outer edge

Net distance below the working surface	Minimum horizontal distance
Up to 5 feet	8 feet
5 to 10 feet	10 feet
Greater than 10 feet	13 feet

Warning-line systems for roofing work

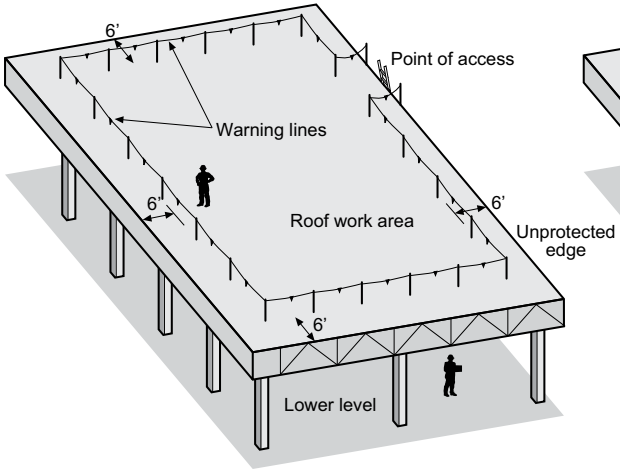
Roofing work refers to hoisting, storing, applying, and removing roofing materials and equipment. Roofing work includes work on related insulation, sheet metal, and vapor barriers, but does not include construction of the roof deck or leading-edge work.

A warning-line system for roofing work consists of ropes, wires, or chains, and supporting stanchions that mark off the area where roofing work can be done without guardrails, personal fall-arrest systems, restraint systems, or safety nets. Warning-line systems can only be used for roofing work on roofs that have slopes of 2:12 or less, vertical to horizontal. The purpose of the line is to warn roofers that they are near an unprotected edge.

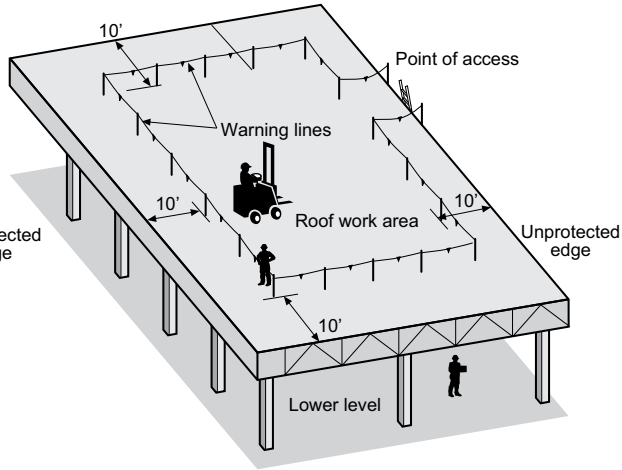
The warning line must be at least six feet from an unprotected edge and meet the following criteria:

- Be flagged at least every six feet with high-visibility material.
- Be rigged so that the line is 34 to 39 inches from the walking/working surface.
- Have a minimum tensile strength of 500 pounds. Don't use plastic caution tape for a warning line.
- Be attached to each stanchion so that tension on one section of the line will not cause an adjacent stanchion to tip over. Stanchions must be able to support a force of at least 16 pounds applied horizontally in the direction of the roof edge without tipping over.

Those who do roofing work between the warning line and an unprotected roof edge must be protected with personal fall-arrest systems, fall-restraint systems, guardrail systems, safety monitoring systems, or safety nets.



Warning-line system where no mobile equipment is used



Warning-line system where mobile equipment is used

Warning lines for non-roofing construction activities

Construction trades that don't do roofing work can use warning lines similar to those allowed for roofing work; however, non-roofing work warning lines only alert workers who are approaching an area where unprotected fall hazards exist and are not considered a fall protection systems.

Setting up. Non-roofing work warning lines also differ from warning lines used by roofers by where they are set up. The setback distance for non-roofing warning lines must be far enough back to prevent worker exposure to fall hazards. When determining the appropriate setback distance, factors such as, but not limited to, weather, visibility, the slope and condition of the work surface, the work performed, materials handled, workers' experience, and supervision must be considered. While the minimum setback distance for non-roofing warning lines is 10 feet, when these factors are taken into consideration, or if work site conditions change, the 10-foot setback distance may need to be increased.

You can use a warning line to alert workers they are approaching an area where unprotected fall hazards exist. The warning line must be set up so that it prevents fall exposures. Signs and flagging emphasize the fall hazard.

Safe practices

- The work surface should be flat or have a slope of 2:12 or less.
- The warning line should be 34 to 39 inches above the work surface.
- The warning line should be rope, wire, or a chain. Avoid using plastic tape for a warning line; workers should be able to feel the line if they back up against it, even if they are wearing heavy clothing.
- The warning line should be flagged at least every six feet with high-visibility material and have warning signs that are visible to workers.
- Stanchions that support the warning line should be able to withstand a force of at least 16 pounds, applied horizontally in the direction of the unprotected edge, without tipping over.
- No workers can enter the area between the warning line and the unprotected edge unless they are protected by an applicable fall protection system described in Subdivision M, 1926.502, *Fall Protection Systems Criteria and Practices*.

➲ ***Never use a warning line as a substitute for a guardrail.***

Safety monitoring for roofing work

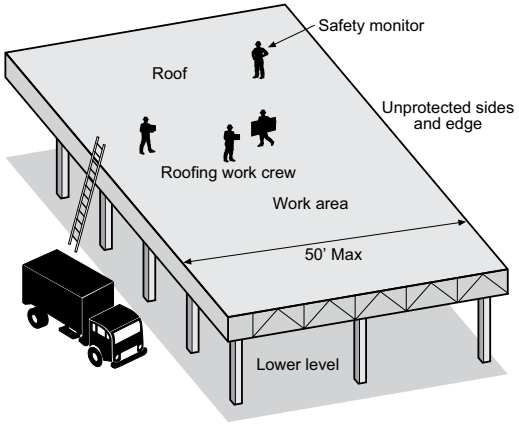
This system uses a person (safety monitor), rather than a mechanical system to warn roofers when they are in danger of falling. The safety monitor, who must be a competent person, is responsible for recognizing fall hazards and warning workers about them.

Safety monitoring can be used only to protect those who do roofing work on roofs that have slopes no greater than 2:12 and widths no greater than 50 feet. Safety monitoring on roofs wider than 50 feet is not permitted unless a warning-line system also protects the workers.

The safety monitor's responsibilities include:

- Recognizing fall hazards
- Warning workers when they are unaware of hazards or are not working safely
- Staying on the same walking/working surface as the workers to watch them and to communicate with them while they are working
- Avoiding any other work or distracting activity while monitoring the workers

Only those who are doing roofing work are permitted in the area controlled by the safety monitor. Mechanical equipment can't be used or stored in the area.



A typical safety-monitoring system

Catch platforms

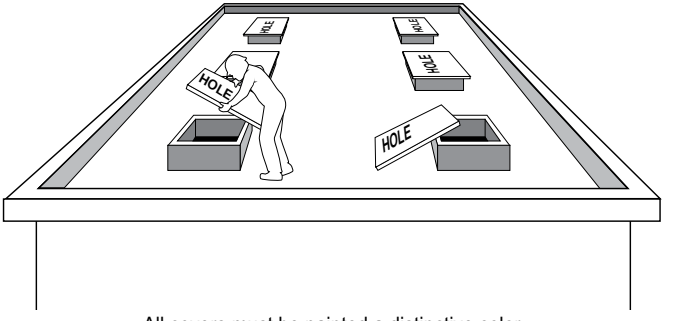
A catch platform is a stable platform with attached standard guardrails that can "catch" a falling worker or materials. You can use a catch platform to prevent workers from falling when other systems or methods are not feasible. Because a catch platform is a scaffold – and covered by Subdivision L (*Scaffolds*) requirements – it must be able to support its own weight and at least four times the maximum intended load applied or transmitted to it. The maximum intended load includes workers and materials, and the impact force of the fall.

➲ ***For more information about scaffolds, see Part four – Supported access***

Covers for holes

Simple and effective when they are properly installed, rigid covers prevent workers from falling through skylights or temporary openings and holes in walking/working surfaces. Covers must:

- Support at least twice the maximum expected weight of workers, equipment, and materials. Skylights are not considered covers unless they meet this strength requirement.
- Be secured so they will not be displaced accidently.
- Be large enough to provide appropriate overlap to prevent workers from falling through, and have full-edge bearing on all four sides.
- Be painted with a distinctive color or marked with the word HOLE or COVER.
- Be left in place over the hole until access is needed, and inspected periodically to identify deterioration.



All covers must be painted a distinctive color or marked with the word HOLE or COVER.

Plywood hole covers. Heavy plywood is a common choice for covering temporary holes in floors and roofs, but plywood strength and durability can vary. Some materials, including plywood scraps from shipping crates or similar scrap products, do not have structural value or span ratings, making it hard to know if they are strong enough. In addition, strength information on the plywood is occasionally covered with paint. Plywood is susceptible to damage over time from exposure to water, traffic, and heavy loads that may reduce its strength. Some indicators of reduced-strength plywood may include cracks, chips, a warped appearance, a worn surface, de-lamination, and water stains. Expected damage after exposure to water depends on whether the plywood is exterior-grade or interior-grade. The binding agents (i.e., adhesive) used to adhere interior-grade plywood layers degrade more rapidly in a moist environment than do the binders used in exterior-grade plywood.

Fences and barricades

Fences and barricades are warning barriers, usually made from posts and wire or boards that keep people away from hazards such as wells, pits, and shafts.

Protecting workers from falling objects

Be aware of those working above and below you. Protect yourself and others from falling objects with one or more of the following methods:

- **Canopies.** Make sure canopies will not collapse or tear from an object's impact.
- **Toeboards.** Toeboards must be least 3½ inches high and strong enough to withstand a force of at least 50 pounds applied downward or outward.
- **Panels and screens.** If you need to pile material higher than the top edge of a toeboard, install panels or screens to keep the material from dropping over the edge.
- **Barricades and fences.** Use them to keep people away from areas where falling objects could hit them.

➲ ***When doing overhand bricklaying, keep materials and equipment (except masonry and mortar) at least four feet from the working edge.***

➲ ***When doing roofing work, keep materials and equipment at least six feet from the roof edge unless there are guardrails along the edge. All piled, grouped, or stacked material near the roof edge must be stable and self-supporting.***

When hardhats are required. Workers must wear hardhats when their jobs expose them to falling objects. In addition, employers must do one of the following to reduce employees' exposure to objects that could fall from upper levels:

- Erect toeboards, screens, or guardrail systems on upper levels to prevent objects from falling.
- Build a canopy over workers to prevent falling objects from striking them.
- Erect a barricade that prevents workers from entering an area where they could be exposed to falling objects.

Employees must be trained before they begin tasks that could expose them to fall hazards. The trainer must be a competent person.

Photo: Kevin Weeks

Part seven – Training workers about fall protection

- Why train workers about fall protection?
- Employers: Your responsibility
- Required training for workers exposed to fall hazards

Why train workers about fall protection?

Workers need to know about the workplace hazards they may be exposed to, how to recognize the hazards, and how to minimize their exposure. The best way for them to learn is through training. Training ensures that they know about the hazards and can demonstrate how to protect themselves from falling.

➲ ***Some employers assume they can train their employees simply by showing them a fall protection training video or giving them a safe practice guide (even this one!). But that's not training.***

Photo: Renee Stapleton, Oregon OSHA

You can't assume employees know how to protect themselves from falls. This one put his personal fall-arrest gear on upside down.

Employers: Your responsibility

If you're an employer, you're responsible for ensuring that your employees can recognize fall hazards and that they know how to protect themselves before they're exposed to the hazards.

You can't assume your employees know how to protect themselves from falls. If they're starting work on a new site, for example, they might not recognize fall hazards or know how to protect themselves unless you train them.

Required training for workers exposed to fall hazards

Workers who could be exposed to fall hazards must understand the hazards and know procedures that minimize the hazards. As an employer, you can determine how to train your employees. What is important is that, through training, your employees can recognize fall hazards and know how to minimize the hazards.

➲ ***The trainer must be a competent person. (Recall that a competent person is one who can identify work-site hazards and who has management authority to control them.) The trainer must know and be able to explain the following:***

- The nature of fall hazards at the work site
- Procedures for erecting, maintaining, and disassembling fall protection systems
- How to use and operate fall protection systems
- The role of each employee who may be affected by a safety-monitoring system
- The restrictions that apply to mechanical equipment used during roofing work
- The procedure for handling and storing materials and for erecting protection from falling objects
- The applicable requirements of Subdivision M for the type of fall protection systems used

When to train. Employees must be trained before they begin tasks that could expose them to fall hazards or before they use fall protection systems. They must be retrained when they don't recognize fall hazards, when they don't follow safe practices for using fall protection systems, and when changes in the workplace or in the fall protection systems used make their previous training incomplete or obsolete.

What to put in writing. Keep a record of each employee's fall protection training. Include the employee's name, the training date, and the trainer's name. Record the information on a simple form like the example in Table 7.

Table 7: Example of a fall protection training form

Employee name	Training date	Trainer's signature	Type of training
Jim Smith	1/4/2016	Frank Jones	Identifying fall hazards (initial training)
Art Smith	4/4/2016	Frank Jones	General fall protection procedures
Miles Smith	4/4/2016	Frank Jones	General fall protection procedures
Peggy Smith	4/4/2016	Frank Jones	Non-roofing work warning lines
Mary Lou Smith	5/4/2016	Frank Jones	Using personal fall-arrest systems
Jancis Smith	7/4/2016	Frank Jones	Hazard identification (retraining)

Before you use a personal fall-arrest system, inspect components for damage or wear.

Photo: Renee Stapleton, Oregon OSHA

Part eight – Maintaining equipment

- Inspecting equipment
- Summary: Inspecting, cleaning, and storing equipment

Inspecting equipment

Pay attention to the condition of your equipment. Inspect it frequently, keep it clean, and store it properly, and it won't let you down.

Inspecting fall-arrest, fall-restraint, and positioning-device systems. Every time (before) you use a personal fall-arrest, restraint, or positioning-device system, inspect the components for damage or excessive wear. Replace any component that looks damaged. Don't use a personal fall-arrest system that has arrested a fall unless a competent person has determined that the system is safe to use.

Harness, lifeline, and anchorage. Inspect these components regularly. Table 8 shows what to look for.

Table 8: Inspecting harness, lifeline, and anchorage

Component	What to look for
Harness webbing	Frayed edges, broken fibers, pulled stitches, cuts, burns, and chemical damage
Harness D-rings	Cracks, breaks, and rough or sharp edges; the D-ring should pivot easily
Harness buckles	Excessive wear, frayed or cut fibers, broken stitching
Harness grommets	Loose, bent, or broken grommets, and punched holes not made by the manufacturer
Lifelines	Wear or deterioration
Anchorages and anchorage connectors	Look for abrasion and damaged threads or swages. Inspect stitching and loops on synthetic slings for cuts, cracks, or frayed and broken stitching. Look for excessive kinks or damaged steel fibers.

Snaphooks. Look for cracks, excessive wear, and corrosion. The snaphooks should open easily and close firmly. Keeper locks must prevent the keeper from opening when it is closed.

Lanyards. Inspect before use. Table 9 shows what to look for.

Table 9: Inspecting lanyards	
Type of lanyard	**What to look for**
Wire rope lanyard	Cuts, frayed strands, or excessive wear
Web lanyard	Cuts, discoloration, cracks, frayed or broken stitching
Rope lanyard	Frayed or cut fibers; the entire length of the rope should have the same diameter
Shock-absorbing lanyard	Cuts, discoloration, cracks, frayed or broken stitching; remove a lanyard from service if any part of the warning label is exposed

Self-retracting lifelines. Look for cuts, frayed strands, or excessive wear in the line and damage to the housing. If the unit needs service, check the manufacturer's recommendations. Don't try to repair it yourself.

Guardrail systems. Inspect manila, plastic, or synthetic rope used for top rails or midrails to ensure that the rope meets the minimum strength and rail height requirements for guardrail systems in Subdivision M. [See Subdivision M, 1926.502(b).]

Safety-net systems. Inspect safety nets for damage or deterioration weekly and after any event that could damage them. Remove defective components from service.

Ladders. A competent person must periodically inspect ladders, and immediately after any event that could damage them.

Scaffolds. A competent person must inspect a scaffold and its components after it has been erected, before each shift, and after any event — including severe weather — that could damage it. The inspection should include the foundation, platform, guardrails, and access areas.

Equipment inspections are critical.
Do you see the small fracture in this picture?

Suspension scaffolds. A competent person must inspect suspension ropes before each shift and after any event that could damage them. Inspect and tighten wire rope clips to the manufacturer's recommendations at the start of each shift. Frequently inspect manila or synthetic rope used for top rails or midrails to ensure that it meets the minimum strength and rail height requirements for suspension scaffolds in Subdivision M. [See Subdivision M, 1926.502(b).].

Crane- and derrick-suspended personnel platforms

- **After a trial lift.** A competent person must immediately inspect the rigging, personnel platform, and the base that supports the crane or derrick after a trial lift.
- **After proof testing.** A competent person must immediately inspect the platform and rigging after they have been proof tested.

Summary: Inspecting, cleaning, and storing equipment

Inspecting equipment

- Follow manufacturers' instructions and warnings.
- Inspect equipment before using it. Look for damaged or missing parts. Labels, warnings, and other instructions should be legible.
- If equipment looks like it needs repair, remove it from service and have a competent person examine it.
- Have a competent person regularly inspect equipment.
- Mark equipment with a unique code or item number. Identification numbers make it easier to keep track of the equipment and to document maintenance or repair.

Photo: Paul A. Anderson, California OSHA

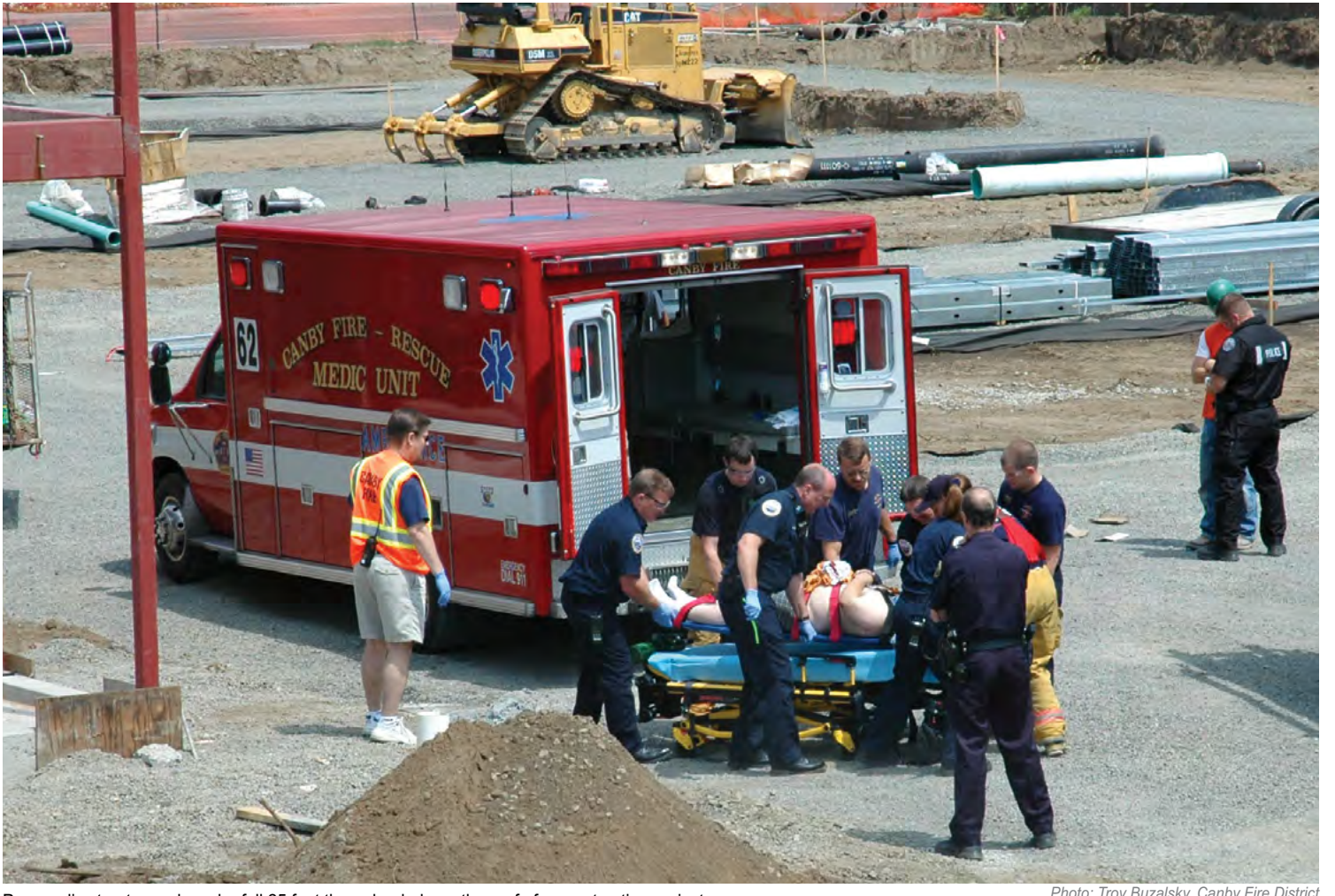
Should this worker begin his inspection at his hard hat?

Cleaning equipment

- Wash synthetic rope and body harnesses in soapy water to remove dirt; rinse them with clean water. Air-dry at room temperature. Don't use cleaning solvents; solvents can damage synthetic material.
- Don't lubricate moving parts unless the manufacturer requires it; lubricants attract dirt.
- Don't remove information labels and warnings; make sure they are still legible after cleaning.

Storing equipment

- Follow manufacturer's instruction for storing equipment.
- Store equipment in an area that is clean, dry, and moisture-free; avoid excessive heat, light, oil, and corrosive chemicals.



Paramedics treat a worker who fell 25 feet through a hole on the roof of a construction project.

Photo: Troy Buzalsky, Canby Fire District

Part nine – Responding to falls

- Prompt rescue required
- Developing an emergency-response plan
- Summary: Responding to falls

Prompt rescue required

The best strategy for protecting workers from falls is to eliminate the hazards that cause falls. If you can't eliminate the hazards, you must protect workers with an appropriate fall protection system or method. If a worker is suspended in a personal fall-arrest system, you must provide for a prompt rescue.

➲ ***Prompt means immediately.*** A worker suspended in a harness after a fall can lose consciousness if the harness puts too much pressure on arteries. A worker suspended in a body harness must be rescued in time to prevent serious injury. If a fall-related emergency could happen at your work site, you should have a plan for responding immediately. Workers who use personal fall-arrest systems must know how to promptly rescue themselves after a fall or they must be promptly rescued.

Developing an emergency-response plan

Keep it simple. Your plan should show that you have thought about how to eliminate and control hazards and that workers know how to respond promptly if something goes wrong.

Get others involved in planning. When other workers participate, they may contribute valuable information and be more likely to respond effectively during an emergency. Key planning objectives:

- Identify the emergencies that could affect your site.
- Establish a chain of command.
- Establish procedures for responding to the emergencies.
- Identify critical resources and rescue equipment.
- Train on-site responders.

Identify emergencies that could affect your workplace. Identify any event that could threaten worker safety or health. Two examples:

- A worker suspended in a full-body harness after a fall
- A worker on a scaffold who contacts an overhead power line

Identify critical resources and rescue equipment. Prompt rescue will not happen without trained responders, appropriate medical supplies, and the right equipment for the emergency.

- **First-aid supplies.** Every work site needs medical supplies for common injuries. Does your site have a first-aid kit with medical supplies for the types of injuries that are likely to occur? Store the supplies in clearly marked, protective containers and make them available to all shifts.
- **Rescue equipment.** Identify on-site equipment that responders can use to rescue a suspended worker. Extension ladders and mobile lifts are useful and available at many sites. Determine where and how each type of equipment would be most effective during a rescue. Make sure the equipment will permit rescuers to reach a fall victim, that it is available when rescuers need it, and that rescuers know how to use it.

Will your longest ladder reach a suspended worker? If not, what equipment *will* reach the worker? When equipment is needed for a rescue, will workers know where it is and how to use it? Consider how seasonal and environmental conditions may affect rescue equipment and those who use it. Equipment that works for summer rescues may not work for winter rescues.

Train on-site responders. An effective emergency-response plan ensures that on-site responders know emergency procedures, how to use available rescue equipment, and — if necessary — how to contact off-site responders. Workers who use personal fall-arrest systems and who work alone must know how to rescue themselves. Those who work at a remote site may need a higher level of emergency training than those who work near a trauma center or a fire department.

Establish a chain of command. All workers must know their roles and responsibilities during an emergency. A chain of command designates one person with overall responsibility for managing an emergency to those responsible for carrying out specific emergency-response tasks. Make sure that back-up personnel can take over when primary responders are not available.

Establish procedures for responding to emergencies. Procedures are instructions for accomplishing specific tasks. Emergency procedures are important because they tell workers exactly what to do to ensure their safety during an emergency. Your emergency-response plan should include the following procedures — preferably in writing — that describe what people must know and do to ensure that a fallen worker receives prompt attention:

- How to report an emergency
- How to rescue a suspended worker
- How to provide first aid

After an emergency, review the procedures; determine if they should be changed to prevent similar events and revise them accordingly.

Summary: Responding to falls

Before on-site work begins

- Identify emergencies that could affect your work site.
- Establish a chain of command system.
- Document procedures for responding to emergencies and make sure they are available at the site.
- Post emergency-responder phone numbers and addresses at the work site.
- Identify critical resources and rescue equipment.
- Train on-site responders.
- Identify off-site responders and inform them about any conditions at the site that may hinder a rescue effort.
- Identify emergency entry and exit routes.
- Make sure responders have quick access to rescue and retrieval equipment, such as lifts and ladders.

During on-site work

- Identify on-site equipment that can be used for rescue and retrieval, such as extension ladders and mobile lifts.
- Maintain a current rescue-equipment inventory at the site. Equipment may change frequently as the job progresses.
- Re-evaluate and update the emergency-response plan when on-site work tasks change.

When an emergency occurs

- First responders should clear a path to the victim. Others should direct emergency personnel to the scene. You can use 911 for ambulance service; however, most 911 responders are not trained to rescue a worker suspended in a personal fall-arrest system.
- Make sure only trained responders attempt a technical rescue.
- Prohibit all nonessential personnel from the rescue site.

After an emergency

- Report fatalities and catastrophes to Oregon OSHA within eight hours. Call 503-378-3272 or 800-922-2689 (toll-free).
- Report work-related injuries or illnesses that cause the loss of an eye, an amputation or avulsion that includes bone or cartilage loss, and in-patient hospitalization for medical treatment (other than first aid) to Oregon OSHA within 24 hours.
- Identify equipment that may have contributed to the emergency and put it out of service.
- Have a competent person examine equipment. If the equipment is damaged, repair or replace it. If the equipment caused the accident, determine how and why.
- Document in detail the cause of the incident and describe how it can be prevented from happening again.
- Review emergency procedures. Determine how the procedures could be changed to better handle similar events. Revise the procedures accordingly.

An example of an **established floor**. An established floor is any floor where all the exterior walls are in place.

Part ten – An overview of Subdivision M

- About Subdivision M
- **Scope, application, and definitions**
- Duty to have fall protection
- Fall protection systems, criteria, and practices
- Training requirements

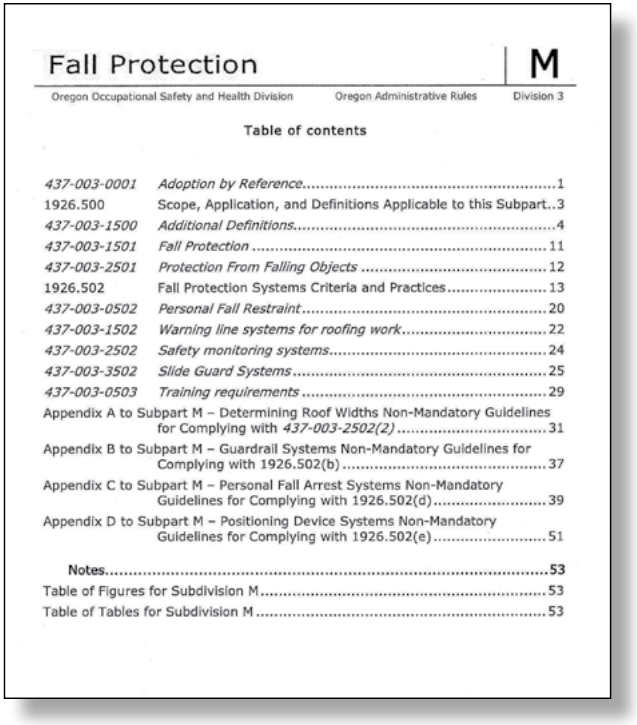
About Subdivision M

Subdivision M, which covers Oregon OSHA's fall protection requirements for the construction industry, has four parts:

- Scope, application, and definitions: 1926.500
- Duty to have fall protection: 437-003-1501
- Fall protection systems, criteria, and practices: 1926.502, 437-003-0502, 437-003-1502, and 437-003-2502.
- Training requirements: 437-003-0503

Also included in Subdivision M are four non-mandatory appendices:

- Guidelines for complying with safety-monitoring systems for roofing work: **Appendix A**
- Guidelines for complying with guardrail systems: **Appendix B**
- Guidelines for complying with personal fall-arrest systems: **Appendix C**
- Guidelines for complying with positioning-device systems: **Appendix D**



Fall Protection | M

Oregon Occupational Safety and Health Division — Oregon Administrative Rules — Division 3

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Subdivision M covers Oregon OSHA's fall protection requirements for the construction industry.

Scope, application, and definitions

Covered in 1926.500 are the scope and limitations of **Subdivision M** rules and the definitions of key words.

➲ ***Subdivision M's requirements do not apply to workers who inspect, investigate, or assess workplace conditions before construction work begins or after all construction work has been completed.***

Duty to have fall protection

The requirements in 437-003-1501(1), establishes the general fall protection requirement for workers who walk or work at heights of six feet or higher when performing construction activities.

Fall protection requirements not covered in Subdivision M. Subdivision M does not cover fall protection requirements for the activities shown in Table 10.

Table 10: Fall protection requirements not covered in Subdivision M

Activity	Find the requirements in
Working from scaffolds	Subdivision 3/L: Scaffolding
Working from cranes and derricks	Subdivision 3/CC: Cranes and Derricks in Construction
Crossing over an excavation	Subdivision 3/P: Excavations
Structural-steel erection	Subdivision 3/R: Steel Erection
Tunneling operations	Subdivision 3/S: Underground Construction, Caissons, Cofferdams, and Compressed air
Working on electric transmission and distribution lines	Subdivision 2/RR: Power Generation,Transmission, and Distribution
Working from stairways or ladders	Subdivision 3/X: Stairways and Ladders

Fall protection systems, criteria, and practices

The requirements in 1926.502, 437-003-0502, 437-003-1502, and 437-003-2502, *Fall protection systems criteria and practices*, cover installing, constructing, and using the following:

- **Guardrail systems:** 1926.502(b)
- **Safety-net systems:** 1926.502(c)
- **Personal fall-arrest systems:** 1926.502(d)
- **Personal fall-restraint systems:** 437-003-0502
- **Positioning-device systems:** 1926.502(e)
- **Warning-line systems for roofing work:** 437-003-1502 and 1926.502(f)
- **Safety-monitoring systems for roofing work:** 437-003-2502
- **Covers for holes in walking/working surfaces:** 1926.502(i)
- **Protection from falling objects:** 437-003-2501 and1926.502(j)

Training requirements

The requirements in 437-003-0503, cover workers who may be exposed to fall hazards.

Training program. Workers must be trained to recognize fall hazards and to know procedures that minimize the hazards. Workers must be trained before they begin tasks that could expose them to fall hazards or before they use fall protection systems. The trainer must be a competent person who understands the fall hazards and can explain to the workers how to protect themselves.

Certification of training. Each employee's name, training date, and the trainer's signature must be documented in the training record.

Retraining. Employees must be retrained when they don't recognize fall hazards, when they don't follow safe practices for using fall protection systems, and when changes in the workplace or in the fall protection systems used make their previous training obsolete.

Notes

Notes

Notes

Oregon OSHA Services

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

Enforcement

- **503-378-3272; 800-922-2689; enforce.web@oregon.gov**
- Offers pre-job conferences for mobile employers in industries such as logging and construction.
- Inspects places of employment for occupational safety and health hazards and investigates workplace complaints and accidents.
- Provides abatement assistance to employers who have received citations and provides compliance and technical assistance by phone.

Consultative Services

- **503-378-3272; 800-922-2689; consult.web@oregon.gov**
- Offers no-cost, on-site safety and health assistance to help Oregon employers recognize and correct workplace safety and health problems.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, assistance to new businesses, the Safety and Health Achievement Recognition Program (SHARP), and the Voluntary Protection Program (VPP).

Standards and Technical Resources

- **503-378-3272; 800-922-2689; tech.web@oregon.gov**
- Develops, interprets, and gives technical advice on Oregon OSHA's safety and health rules.
- Publishes safe-practices guides, pamphlets, and other materials for employers and employees.
- Manages the Oregon OSHA Resource Center, which offers safety videos, books, periodicals, and research assistance for employers and employees.

Appeals

- **503-947-7426; 800-922-2689; admin.web@oregon.gov**
- Provides the opportunity for employers to hold informal meetings with Oregon OSHA on concerns about workplace safety and health.
- Discusses Oregon OSHA's requirements and clarifies workplace safety or health violations.
- Discusses abatement dates and negotiates settlement agreements to resolve disputed citations.

Conferences

- **503-378-3272; 888-292-5247, Option 1; oregon.conferences@oregon.gov**
- Co-hosts conferences throughout Oregon that enable employees and employers to learn and share ideas with local and nationally recognized safety and health professionals.

Public Education

- **503-947-7443; 888-292-5247, Option 2; ed.web@oregon.gov**
- Provides workshops and materials covering management of basic safety and health programs, safety committees, accident investigation, technical topics, and job safety analysis.

Need more information? Call your nearest Oregon OSHA office.

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Salem, OR 97301-3882
Phone: 503-378-3272
Toll-free: 800-922-2689

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541-388-6066
Consultation: 541-388-6068

Eugene
1500 Valley River Drive, Suite 150
Eugene, OR 97401-4643
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Consultation: 541-776-6016

Pendleton
200 SE Hailey Ave.
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541-276-9175
Consultation: 541-276-2353

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Tigard, OR 97224-7696
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