

Walking-Working Surfaces and Fall Protection



This course is a basic awareness-level introduction to safe practices related to walking-working surfaces, ladders, stairs, fall protection and protection from falling objects, as detailed in OSHA 1910 Subpart D, Walking-Working Surfaces.

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OSHAcademy Course 114 Study Guide

Walking-Working Surfaces and Fall Protection

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Contact OSHAcademy to arrange for use as a training document.

This study guide is designed to be reviewed off-line as a tool for preparation to successfully complete OSHAcademy Course 114.

Read each module, answer the quiz questions, and submit the quiz questions online through the course webpage. You can print the post-quiz response screen which will contain the correct answers to the questions.

The final exam will consist of questions developed from the course content and module quizzes.

We hope you enjoy the course and if you have any questions, feel free to email or call:

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Modules and Learning Objectives

Module 1 – Surface Hazards Causing Falls

Learning objectives in this module include:

-) Describe the general requirements for good housekeeping practices.
-) List at least five best practices for safe ladder use.
-) Describe the "three-point-control" and correct ladder angle guidelines for portable ladders.
-) Describe at least five guidelines for the safe use of fixed ladders, mobile ladder stands, and platforms.
-) List at least five requirements for the design of standard, spiral, and alternating tread-type stairs.
-) Identify guidelines for the safe use of dockboards.
-) Describe requirements for rope descent system use, capacity, care, and maintenance.
-) Discuss training and retraining requirements for the hazards associated with falls.

Module 2 – Protection Against Falls

Learning objectives in this module include:

-) Describe the three primary fall protection systems for use while working at heights.
-) Describe the fall protection systems used to protect employees working around holes, openings, runways and ramps, pits and over dangerous equipment.
-) Describe the safety guidelines while climbing fixed ladders.
-) Describe stairway guardrail, stair rail, and hand rail requirements.
-) Describe the safety requirements while working on low-slope roofs, including the use of designated areas.

-) List the components and describe the requirements for guardrail systems.
-) Describe the fall protection requirements for stairways, handrails, and stair rail systems.
-) Describe safe practices when using fixed ladders.
-) Discuss the design and safety requirements for toeboards.

Course Introduction

Everyone knows that surfaces do not walk or work, yet OSHA has many requirements that apply to them. So, it's important to know what they are. A walking-working surface is any horizontal or vertical surface on or through which an employee walks, works, or gains access to a work area. The rules apply to walking-working surfaces in all general industry workplaces.

This training is only a short summary of each of the section listed below. It is not inclusive. Please review [OSHA Standard 1910 Subpart D, Walking-Working Surfaces](#), for a detailed presentation.

-) 1910.22 - General requirements
-) 1910.23 - Ladders
-) 1910.24 - Step bolt and manhole steps
-) 1910.25 - Stairways
-) 1910.26 - Dockboards
-) 1910.27 - Scaffolds and rope descent systems
-) 1910.28 - Duty to have fall protection and falling object protection
-) 1910.29 - Fall protection systems and falling object protection - criteria and practices.
-) 1910.30 - Training requirements

Module 1: Surface Hazards Causing Falls

Slips, trips, and falls constitute the majority of general industry accidents. They cause 15% of all accidental deaths, and are second only to motor vehicles as a cause of death.

[Click here](#) for a checklist to test your compliance with OSHA's walking and working surfaces standards for the general industry.

General Requirements

Housekeeping: The employer must ensure:

-) All places of employment, passageways, storerooms, service rooms, and walking-working surfaces are kept in a clean, orderly, and sanitary condition.
-) The floor of each workroom is maintained in a clean and, to the extent feasible, in a dry condition. When wet processes are used, drainage must be maintained and, to the extent feasible, dry standing places, such as false floors, platforms, and mats must be provided.
-) Walking-working surfaces are maintained free of hazards such as sharp or protruding objects, loose boards, corrosion, leaks, spills, snow, and ice.

Loads: The employer must ensure that each walking-working surface can support the maximum intended load for that surface.

Access and egress: The employer must provide, and ensure each employee uses, a safe means of access and egress to and from walking-working surfaces.

Inspection, maintenance, and repair: The employer must ensure:

-) Walking-working surfaces are inspected, regularly and as necessary, and maintained in a safe condition;
-) Hazardous conditions on walking-working surfaces are corrected or repaired before an employee uses the walking-working surface again. If the correction or repair cannot be made immediately, the hazard must be guarded to prevent employees from using the walking-working surface until the hazard is corrected or repaired; and

-) When any correction or repair involves the structural integrity of the walking-working surface, a qualified person performs or supervises the correction or repair.

Quiz Instructions

After each section, there is a quiz question. Make sure to read the material in each section to discover the correct answer to these questions. Circle the correct answer. When you are finished go online to take the final exam. This exam is open book, so you can use this study guide.

1. Which of the following is the cause 15% of all accidental deaths, and are second only to motor vehicles as a cause of death?

- a. Slips, trips, and falls
- b. Strains and sprains
- c. Falls from scaffolds
- d. Struck by heavy objects

Ladders

The employer must ensure that each ladder used meets the requirements of [OSHA 1910.25 Subpart D](#). This information covers all ladders, except when the ladder is:

-) Used in emergency operations such as firefighting, rescue, and tactical law enforcement operations, or training for these operations; or
-) Designed into or is an integral part of machines or equipment.

General Requirements

The employer must ensure that:

-) when the ladder is placed in position for use, ladder rungs, steps, and cleats should be parallel, level, and uniformly spaced;
-) wooden ladders are not coated with any material which may obscure structural defects;
-) metal ladders are made with corrosion-resistant material or protected against corrosion;

- J ladder surfaces are free of puncture and laceration hazards;
- J ladders are used only for the purposes for which they were designed;
- J ladders are inspected before initial use in each work shift, and more frequently as necessary, to identify any visible defects which could cause employee injury;
- J any ladder with structural or other defects is immediately tagged "Dangerous: Do Not Use" or with similar language and removed from service until repaired, or replaced;
- J each employee faces the ladder when climbing up or down it;
- J each employee uses at least one hand to grasp the ladder when climbing up and down it; and
- J no employee carries any object or load which could cause the employee to lose balance and fall while climbing up or down the ladder.

Securing Ladders

There is a significant risk of falling if portable ladders are not safely positioned each time they are used. Unsecured ladders can slip or shift due to the weight load or lack of friction between the ladder and contact points. It is very easy to lose your balance while getting on or off an unsteady ladder. Be sure to evaluate the situation; do not use a ladder on slippery surfaces unless it is secured or has slip-resistant feet.

Inspecting Ladders

Before using a ladder, a competent person must inspect the ladder for visible defects, such as broken or missing rungs. If a defective ladder is found, it must be immediately marked with a defective sign or clearly labeled with a "Do Not Use" sign. It should then be taken from service until it is completely repaired.

2. When a ladder is placed into position, ladder rungs, steps, and cleats must each meet all of the following criteria, EXCEPT ____.

- a. be parallel
- b. made of metal
- c. be level
- d. uniformly spaced

Portable Ladders

Portable ladders help you access a work area or provide support while you work. Portable ladders make getting to a work area easy, but they can increase the potential for falls if not used properly. Portable ladders are versatile, economical, and easy to use. However, workers sometimes use them without thinking safety.

Falls from portable ladders are one of the leading causes of occupational fatalities and injuries. Here are some OSHA requirements for using portable ladders:

-) The minimum clear distance between side rails for all portable ladders must be 11.5 inches (29 cm).
-) The rungs and steps of portable metal ladders must be corrugated, knurled, dimpled, coated with skid-resistant material or treated to minimize slipping.
-) Non-self-supporting and self-supporting portable ladders must support at least four times the maximum intended load; extra heavy-duty type 1A metal or plastic ladders must sustain 3.3 times the maximum intended load.
-) The side rails must extend at least 3 feet (.9 m) above the upper landing surface. When that is not possible, the ladder must be secured and a grasping device such as a grab rail must be provided.
-) A ladder extension must not deflect under a load that would cause the ladder to slip off its supports.

Ladder Angle

A non-self-supporting ladder should have a set-up angle of about 75 degrees — a 4:1 ratio of the ladder's working length to set-back distance.

Here's how to do it:

-) Stand at the base of the ladder with your toes touching the rails.
-) Extend your arms straight out in front of you. If the tips of your finger just touch the rung nearest your shoulder level, the angle of your ladder has a 4:1 ratio.

3. A non-self-supporting ladder should have a set-up angle of about _____ of the ladder's working length to set-back distance.

- a. 60 degrees or 2:1 ratio or more
- b. 45 degrees in pitch or more
- c. 90 degrees, or a 3:1 angle
- d. 75 degrees, or a 4:1 ratio

Fixed Ladders

The employer must ensure:

-) Fixed ladders are capable of supporting their maximum intended load.
-) The minimum perpendicular distance from the steps or rungs, or grab bars, or both, to the nearest permanent object in back of the ladder is 7 inches (18 cm) and 4.5 inches (11 cm) for pit ladders.
-) Grab bars do not protrude on the climbing side beyond the rungs of the ladder that they serve.
-) The side rails of through or sidestep ladders extend 42 inches (1.1 m) above the top of the access level or landing platform served by the ladder.
-) For through ladders, the steps or rungs are omitted from the extensions, and the side rails are flared to provide not less than 24 inches (61 cm) and not more than 30 inches

(76 cm) of clearance. When a ladder safety system is provided, the maximum clearance between side rails of the extension must not exceed 36 inches (91 cm).

-) For side-step ladders, the side rails, rungs, and steps must be continuous in the extension.
-) Individual-rung ladders are constructed to prevent the employee's feet from sliding off the ends of the rungs.
-) Fixed ladders having a pitch greater than 90 degrees from the horizontal are not used.

Climb Safely - Use Three-Point-Control

Three-point-control vs. three-point-contact positioning: The three-point-control technique requires a worker to use any three of his or her four limbs for reliable, stable support. Another requirement when using the three-point-control technique is that the hands must grasp the horizontal rung of the ladder. A horizontal grip allows the worker to hold their bodyweight and prevent a fall: the vertical grip will not.

The three-point-contact technique is not recommended for positioning because it only requires that any three body parts, not just hands or feet, must contact the ladder to maintain stability.

The three-point-control technique is the best method because the worker has both feet on the ladder and is gripping a horizontal rung, so they are much less likely to fall than if the hand is gripping a vertical rail or another body part is merely resting on a part of the ladder.

Remember, when climbing:

-) keep both feet at the same level, and
-) maintain a horizontal one-hand grip (power grip) with fingers wrapped around the rung of the ladder.

4. What is the minimum distance that fixed ladders, except elevator pit ladders, can be positioned from the nearest permanent structure?

- a. 7 inches
- b. 4.5 inches
- c. 24 inches
- d. 30 inches

Mobile Ladder Stands and Platforms

The employer must ensure:

- J The steps and platforms of mobile ladder stands and platforms are slip resistant. Slip-resistant surfaces must be either an integral part of the design and construction of the mobile ladder stand and platform, or provided as a secondary process or operation, such as dimpling, knurling, shotblasting, coating, spraying, or applying durable slip-resistant tapes;
- J Mobile ladder stands and platforms are capable of supporting at least four times their maximum intended load;
- J Wheels or casters under load are capable of supporting their proportional share of four times the maximum intended load, plus their proportional share of the unit's weight;
- J Mobile ladder stands and platforms with a top step height of 4 feet (1.2 m) or above should have handrails. Removable gates or non-rigid members, such as chains, may be used instead of handrails in special use applications;
- J The maximum work-surface height of mobile ladder stands and platforms does not exceed four times the shortest base dimension, without additional support. For greater heights, outriggers, counterweights, or comparable means that stabilize the mobile ladder stands and platforms and prevent overturning must be used;
- J Mobile ladder stands and platforms that have wheels or casters are equipped with a system to impede horizontal movement when an employee is on the stand or platform; and
- J No mobile ladder stand or platform moves when an employee is on it.

5. How much weight must mobile ladder stands and platforms be capable of supporting?

- a. over 100 pounds per square foot
- b. a minimum of 300 pounds live weight for each worker
- c. at least four times their maximum intended load
- d. 5000 pounds dead weight

Steps

Step bolts: Step bolts are literally used as steps on steel communication and electrical transmission towers. Each step bolt is designed, constructed, and maintained to prevent the employee's foot from slipping off the end of the step bolt. They should be inspected before use. They should be uniformly spaced, and any step bolt bent more than 15 degrees must be removed and replaced prior to use.

Manhole Steps

The employer must ensure that each manhole step is capable of supporting its maximum intended load. They should be made of materials that prevent corrosion. They should be uniformly spaced and should be designed to prevent the employee's foot from slipping off the end. They should be inspected before use and maintained without defects.

Stairways

The employer must ensure:

-) Handrails, stair rail systems, and guardrail systems are provided as required;
-) Vertical clearance above any stair tread to any overhead obstruction is at least 6 feet, 8 inches (203 cm);
-) Stairs have uniform riser heights and tread depths between landings;
-) Stairway landings and platforms are at least the width of the stair and at least 30 inches (76 cm) in depth, as measured in the direction of travel;
-) Each stair can support at least five times the normal anticipated live load, but never less than a concentrated load of 1,000 pounds (454 kg) applied at any point;
-) Standard stairs are used to provide access from one walking-working surface to another. Winding stairways may be used on tanks and similar round structures when the diameter of the tank or structure is at least 5 feet (1.5 m).
-) Spiral, ship, or alternating tread-type stairs are used only when the employer can demonstrate that it is not feasible to provide standard stairs.

6. What is the required vertical clearance above a stair tread to any overhead obstruction?

- a. Between 4 feet and 8 feet
- b. At least 6 feet, 8 inches
- c. Any height over 5 feet
- d. Up to 8 feet, 6 inches

Standard Stairs

The employer must ensure standard stairs installed after January 17, 2017:

- Are installed at angles between 30 to 50 degrees from the horizontal;
- Have a maximum riser height of 9.5 inches (24 cm);
- Have a minimum tread depth of 9.5 inches (24 cm); and
- Have a minimum width of 22 inches (56 cm) between vertical barriers.

Spiral Stairs

The employer must ensure spiral stairs:

- have a minimum clear width of 26 inches (66 cm)
- have a maximum riser height of 9.5 inches (24 cm)
- have a minimum headroom above spiral stair treads of at least 6 feet, 6 inches (2 m), measured from the leading edge of the tread
- have a minimum tread depth of 7.5 inches (19 cm), measured at a point 12 inches (30 cm) from the narrower edge
- have a uniform tread size

Alternating Tread-Type Stairs

The employer must ensure alternating tread-type stairs:

- have a series of treads installed at a slope of 50 to 70 degrees from the horizontal

- J have a distance between handrails of 17 to 24 inches (51 to 61 cm)
- J have a minimum tread depth of 8.5 inches (22 cm); and have open risers if the tread depth is less than 9.5 inches (24 cm)
- J have a minimum tread width of 7 inches (18 cm), measured at the leading edge of the tread (i.e., nosing)

7. Employers must ensure standard stairs are installed at angles ____.

- a. no greater than 70 degrees from the horizontal
- b. between 30 to 50 degrees from the horizontal
- c. determined by a registered structural engineer
- d. that increase with as riser widths increase

Dockboards

The employer must ensure that:

- J Dockboards are capable of supporting the maximum intended load;
 - o Dockboards put into initial service on or after January 17, 2017 are designed, constructed, and maintained to prevent transfer vehicles from running off the dockboard edge;
 - o Exception: When the employer demonstrates there is no hazard of transfer vehicles running off the dockboard edge, the employer may use dockboards that do not have run-off protection.
- J Portable dockboards are secured by anchoring them in place or using equipment or devices that prevent the dockboard from moving out of a safe position. When the employer demonstrates that securing the dockboard is not feasible, the employer must ensure there is sufficient contact between the dockboard and the surface to prevent the dockboard from moving out of a safe position;
- J Measures, such as wheel chocks or sand shoes, are used to prevent the transport vehicle (e.g. a truck, semitrailer, trailer, or rail car) on which a dockboard is placed, from moving while employees are on the dockboard; and

- J Portable dockboards are equipped with handholds or other means to permit safe handling of dockboards.

The employer must ensure that each employee on a dockboard is protected from falling 4 feet (1.2 m) or more to a lower level by a guardrail system or handrails, unless:

- J Dockboards are being used solely for materials-handling operations using motorized equipment;
- J Employees engaged in these operations are not exposed to fall hazards greater than 10 feet (3 m); and
- J Those employees have been trained in accordance with OSHA Standard 1910.30.

8. Which of the following is a suitable measure to prevent vehicles movement while employees are on the dockboard?

- a. A spotter and signal person
- b. Dockboards with handholds
- c. Wheel chocks or sand shoes
- d. Wood planks or rope ties

Scaffold and Rope Descent Systems

Scaffolds

Scaffolds used in general industry must meet the requirements in [29 CFR part 1926, subpart L, Scaffolds](#).

Rope Descent Systems

The employer must ensure:

- J Before any rope descent system is used, the building owner must inform the employer, in writing that the building owner has identified, tested, certified, and maintained each anchorage so it can support at least 5,000 pounds (268 kg), in any direction, for each employee attached.

- J All components of each rope descent system, except seat boards, are capable of sustaining a minimum rated load of 5,000 pounds (22.2 kN). Seat boards must be capable of supporting a live load of 300 pounds (136 kg);
- J The employer must ensure that no employee uses any anchorage before the employer has obtained written information from the building owner that each anchorage meets OSHA requirements.
- J No rope descent system is used for heights greater than 300 feet (91 m) above grade unless the employer demonstrates that it is not feasible to access such heights by any other means or that those means pose a greater hazard than using a rope descent system;
- J The rope descent system is used in accordance with instructions, warnings, and design limitations set by the manufacturer or under the direction of a qualified person;
- J Each employee who uses the rope descent system is trained in accordance with [OSHA 1910.30](#);
- J The rope descent system is inspected at the start of each workshift that it is to be used. The employer must ensure damaged or defective equipment is removed from service immediately and replaced.

9. How much weight must seat boards used with rope descent systems be able to support?

- a. At least 5000 pounds for each worker
- b. The maximum intended load for each employee
- c. A live load of 300 pounds
- d. A dead-weight load of 200 pounds and safety factor of 2

The employer must ensure:

- J The rope descent system has proper rigging, including anchorages and tiebacks, with particular emphasis on providing tiebacks when counterweights, cornice hooks, or similar non-permanent anchorages are used;
- J Each employee uses a separate, independent personal fall arrest system (PFAS) that meets the requirements of [1910 Subpart I, Personal Protective Equipment](#);

- J Prompt rescue of each employee is provided in the event of a fall;
- J The ropes of each rope descent system are effectively padded or otherwise protected, where they can contact edges of the building, anchorage, obstructions, or other surfaces, to prevent them from being cut or weakened;
- J Stabilization is provided at the specific work location when descents are greater than 130 feet (39.6 m);
- J No employee uses a rope descent system when hazardous weather conditions, such as storms or gusty or excessive wind, are present;
- J Equipment, such as tools, squeegees, or buckets, is secured by a tool lanyard or similar method to prevent it from falling; and
- J The ropes of each rope descent system are protected from exposure to open flames, hot work, corrosive chemicals, and other destructive conditions.

10. What is the requirement for use of fall protection when working with a rope descent system?

- a. Only certified competent persons can use PFAS
- b. Each employee uses a separate, independent PFAS
- c. Workers must be "dual secured" while working at height
- d. Body belts are allowed with experienced workers

Training

The employer must provide information and training to each employee prior to exposure to hazards and in a manner that the employee understands.

Fall Hazards

Before any employee is exposed to a fall hazard, the employer must provide training for each employee who uses personal fall protection systems. The employer must ensure that each employee is trained by a qualified person. The employer must train each employee in at least the following topics:

- J The nature of the fall hazards and how to recognize them;

-) The procedures to be followed to minimize hazards;
-) The correct procedures for using, installing, inspecting, operating, maintaining, disassembling, and storing personal fall protection systems.

Equipment Hazards

The employer must train each employee on the proper care, inspection, storage, and use of equipment, including dockboards, rope descent systems, and designated area set-up and use, before an employee uses the equipment.

Retraining

The employer must retrain an employee when the employer has reason to believe the employee does not have adequate understanding and skill. Retraining should also be conducted annually if employees do not perform operations regularly that require fall protection. Situations requiring retraining include the following:

-) When changes in the workplace render previous training obsolete or inadequate;
-) When changes in the types of fall protection systems or equipment to be used render previous training obsolete or inadequate; or
-) When inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee no longer has the requisite understanding or skill necessary to use equipment or perform the job safely.

11. Which of the following situations would NOT require fall protection retraining?

- a. Changes that render previous training obsolete
- b. Initial assignment to jobs requiring fall protection
- c. Changes in equipment make previous training inadequate
- d. Employee demonstrates inadequate knowledge and/or skills

Module 2: Protection Against Falls

General Requirements

The employer must provide and install all fall protection systems and falling object protection before any employee begins work that necessitates fall or falling object protection.

Unprotected Sides and Edges

The employer must ensure that each employee on a walking-working surface with an unprotected side or edge that is 4 feet (1.2 m) or more above a lower level is protected from falling by one or more of the following:

-) guardrail systems;
-) safety net systems; or
-) personal fall protection systems, such as personal fall arrest, travel restraint, or positioning systems.

When the employer can demonstrate it is not feasible or creates a greater hazard to use guardrail, safety net, or personal fall protection systems on residential roofs, the employer must develop and implement a fall protection plan and training.

When the employer can demonstrate the use of fall protection systems is not feasible on the working side of a platform used at a loading rack, loading dock, or teeming platform, the work may be done without a fall protection system, if:

-) The work operation for which fall protection is infeasible is in process;
-) Access to the platform is limited to authorized employees; and,
-) The authorized employees are trained in accordance with OSHA Standard 1910.30.

Hoist Areas

The employer must ensure:

Each employee in a hoist area is protected from falling 4 feet (1.2 m) or more to a lower level by:

-) A guardrail system;
-) A personal fall arrest system; or
-) A travel restraint system.

When any portion of a guardrail system, gate, or chains is removed, and an employee must lean through or over the edge of the access opening to facilitate hoisting, the employee should be protected from falling by a personal fall arrest system.

If grab handles are installed at hoist areas, they must meet the requirements of OSHA Standard 1910.29(l).

1. The general industry employer must ensure that each employee on a walking-working surface with an unprotected side or edge that is _____ or more above a lower level is protected.

- a. 2 feet (0.6 m)
- b. 4 feet (1.2 m)
- c. 6 feet (1.8 m)
- d. 10 feet (3 m)

Holes

The employer must ensure each employee is protected from falling through any hole (including skylights) that is 4 feet (1.2 m) or more above a lower level by one or more of the following:

-) Covers;
-) guardrail systems;
-) travel restraint systems; or
-) personal fall arrest systems.

Each employee must be protected from tripping into or stepping into or through any hole that is less than 4 feet (1.2 m) above a lower level by covers or guardrail systems.

Each employee must be protected from falling into a stairway floor hole by a fixed guardrail system on all exposed sides, except at the stairway entrance. However, for any stairway used

less than once per day where traffic across the stairway floor hole prevents the use of a fixed guardrail system the employer may protect employees from falling into the hole by using a hinged floor hole cover that meets the criteria in OSHA Standard 1910.29 and a removable guardrail system on all exposed sides, except at the entrance to the stairway.

Each employee must be protected from falling into a ladderway floor hole or ladderway platform hole by a guardrail system and toeboards erected on all exposed sides, except at the entrance to the hole, where a self-closing gate or an offset must be used.

Each employee is protected from falling through a hatchway and chute floor hole by:

-) A hinged floor-hole cover and a fixed guardrail system that leaves only one exposed side. When the hole is not in use, the employer must ensure the cover is closed or a removable guardrail system is provided on the exposed sides;
-) A removable guardrail system and toeboards on not more than two sides of the hole and a fixed guardrail system on all other exposed sides. The employer must ensure the removable guardrail system is kept in place when the hole is not in use; or
-) A guardrail system or a travel restraint system when a work operation necessitates passing material through a hatchway or chute floor hole.

2. Employees must be protected from tripping into or stepping into or through any hole that is ____ above a lower level by covers, guardrail systems, travel restraint systems, or personal fall arrest systems.

- a. more than 10 feet (3 m)
- b. less than 10 feet (3 m)
- c. more than 6 feet (1.8 m)
- d. more than 4 feet (1.2 m)

Runways and Similar Walkways

The employer must ensure each employee on a runway or similar walkway is protected from falling 4 feet (1.2 m) or more to a lower level by a guardrail system. When the employer can demonstrate that it is not feasible to have guardrails on both sides of a runway used exclusively for a special purpose, the employer may omit the guardrail on one side of the runway, provided the employer ensures:

-) The runway is at least 18 inches (46 cm) wide; and
-) Each employee is provided with and uses a personal fall arrest system or travel restraint system.

Openings

The employer must ensure each employee on a walking-working surface near an opening where the inside bottom edge of the opening is less than 39 inches (99 cm) above that walking-working surface and the outside bottom edge of the opening is 4 feet (1.2 m) or more above a lower level is protected from falling by the use of:

-) Guardrail systems;
-) safety net systems;
-) travel restraint systems; or,
-) personal fall arrest systems.

Dangerous Equipment

Employees must be protected from falling into dangerous equipment while working at any height.

Work under 4 feet: The employer must ensure that each employee less than 4 feet (1.2 m) above dangerous equipment is protected from falling into or onto the dangerous equipment by a guardrail system or a travel restraint system, unless the equipment is covered or guarded to eliminate the hazard.

Work at 4 feet or more: Each employee 4 feet (1.2 m) or more above dangerous equipment must be protected from falling by a guardrail system, safety net system, travel restraint system, or personal fall arrest systems (PFAS).

Repair, Service, and Assembly Pits Less Than 10 Feet Deep

The use of a fall protection system is not required for a repair pit, service pit, or assembly pit that is less than 10 feet (3 m) deep, provided the employer:

-) Limits access within 6 feet (1.8 m) of the edge of the pit to authorized employees trained in accordance with OSHA Standard 1910.30;
-) Applies floor markings at least 6 feet (1.8 m) from the edge of the pit in colors that contrast with the surrounding area; or places a warning line at least 6 feet (1.8 m) from the edge of the pit as well as stanchions that are capable of resisting, without tipping over, a force of at least 16 pounds (71 N) applied horizontally against the stanchion at a height of 30 inches (76 cm); or places a combination of floor markings and warning lines at least 6 feet (1.8 m) from the edge of the pit. When two or more pits in a common area are not more than 15 feet (4.5m) apart, the employer may comply by placing contrasting floor markings at least 6 feet (1.8 m) from the pit edge around the entire area of the pits; and
-) Posts readily visible caution signs that meet the requirements of [OSHA Standard 1910.145, Specifications for accident prevention signs and tags](#), and state "Caution-Open Pit."

Fixed Ladders

For fixed ladders that extend more than 24 feet (7.3 m) above a lower level, the employer must ensure:

-) **Existing fixed ladders:** Each fixed ladder installed before November 19, 2018 is equipped with a personal fall arrest system, ladder safety system, cage, or well;
-) **New fixed ladders:** Each fixed ladder installed on and after November 19, 2018, is equipped with a personal fall arrest system or a ladder safety system;
-) **Replacement:** When a fixed ladder, cage, or well, or any portion of a section thereof, is replaced, a personal fall arrest system or ladder safety system is installed in at least that section of the fixed ladder, cage, or well where the replacement is located; and

-) **Final deadline:** On and after November 18, 2036, all fixed ladders are equipped with a personal fall arrest system or a ladder safety system. Example: [Ladder Vertical Lifeline System](#).

When a one-section fixed ladder is equipped with a personal fall protection or a ladder safety system or a fixed ladder is equipped with a personal fall arrest or ladder safety system on more than one section, the employer must ensure:

-) The personal fall arrest system or ladder safety system provides protection throughout the entire vertical distance of the ladder, including all ladder sections; and
-) The ladder has rest platforms provided at maximum intervals of 150 feet (45.7 m).

The employer must ensure ladder sections having a cage or well if:

-) Are offset from adjacent sections; and
-) Have landing platforms provided at maximum intervals of 50 feet (15.2 m).
 - o The employer may use a cage or well in combination with a personal fall arrest system or ladder safety system provided that the cage or well does not interfere with the operation of the system.

4. Each fixed ladder installed on and after November 19, 2018, must be equipped with a

_____.

- a. horizontal hand holds for resting
- b. highly visible warning light every 10 feet
- c. personal fall arrest system or a ladder safety system
- d. ladder safety system, cage or well

Scaffolds and Rope Descent Systems

The employer must ensure the following:

-) Each employee on a scaffold is protected from falling in accordance [29 CFR part 1926, subpart L](#); and

- J Each employee using a rope descent system 4 feet (1.2 m) or more above a lower level is protected from falling by a personal fall arrest system. Note: OSHA's construction standard [1926.501, Fall Protection](#), sets a threshold height of 6 feet and greater for worker exposures that demand fall-protection.

Work on Low-Slope Roofs

The following information involves roofs with slope of 3:12 (14 degrees) or less.

- J When work is performed less than 6 feet (1.6 m) from the roof edge, the employer must ensure each employee is protected from falling by a guardrail system, safety net system, travel restraint system, or personal fall arrest system.
- J When work is performed at least 6 feet (1.6 m) but less than 15 feet (4.6 m) from the roof edge, the employer must ensure each employee is protected from falling by using a guardrail system, safety net system, travel restraint system, or personal fall arrest system. The employer may use a designated area when performing work that is both infrequent and temporary.
- J When work is performed 15 feet (4.6 m) or more from the roof edge, the employer must:
 - o Protect each employee from falling by a guardrail system, safety net system, travel restraint system, or personal fall arrest system or a designated area. The employer is not required to provide any fall protection, provided the work is both infrequent and temporary; and
 - o Implement and enforce a work rule prohibiting employees from going within 15 feet (4.6 m) of the roof edge without using fall protection.

5. When work is performed less than 6 feet (1.6 m) from the roof edge, the employer may ensure each employee is protected from falling with each of the following methods, EXCEPT _____.

- a. personal fall arrest systems
- b. travel restraint systems
- c. guardrail systems
- d. designated areas

Designated Areas

When the employer uses a designated area, the employer must ensure:

-) Employees remain within the designated area while work operations are underway; and
-) The perimeter of the designated area is delineated with a warning line consisting of a rope, wire, tape, or chain that meets the requirements of this section.

Each warning line must have a minimum breaking strength of 200 pounds (0.89 kN). The lowest point of the line must not be less than 34 inches (86 cm) and not more than 39 inches (99 cm) above the walking-working surface. The warning line must be erected not less than:

-) 6 feet (1.8 m) from the roof edge for work that is both temporary and infrequent,
-) 10 feet (3 m) from the perpendicular unprotected edge from mobile mechanical equipment, or
-) 15 feet (4.6 m) for other work.

The warning line must be clearly visible from a distance of 25 feet (7.6 m) away, and anywhere within the designated area.

Covers

The employer must ensure each cover for a hole in a walking-working surface:

-) Is capable of supporting without failure, at least twice the maximum intended load that may be imposed on the cover at any one time; and
-) Is secured to prevent accidental displacement.

6. How far from a perpendicular unprotected edge must you place a warning line when operating mobile mechanical equipment?

- a. Not less than 15 feet
- b. Not less than 10 feet
- c. At least 15 feet
- d. At least 6 feet

Fall Protection Systems

General Requirements

The employer must provide and install all fall protection systems and falling object protection before any employee begins work that necessitates fall or falling object protection.

Guardrail Systems

The employer must ensure guardrail systems meet the following requirements:

- J **Top rails:** The top edge height of top rails must be 42 inches (107 cm), plus or minus 3 inches (8 cm), above the walking-working surface.
- J **Midrails:** Midrails, screens, mesh, intermediate vertical members, solid panels, or equivalent intermediate members must be installed between the walking-working surface and the top edge of the guardrail system as follows when there is not a wall or parapet that is at least 21 inches (53 cm) high:
 - o Midrails are installed at a height midway between the top edge of the guardrail system and the walking-working surface;
 - o Screens and mesh extend from the walking-working surface to the top rail and along the entire opening between top rail supports;
 - o Intermediate vertical members (such as balusters) are installed no more than 19 inches (48 cm) apart; and
 - o Other equivalent intermediate members (such as additional midrails and architectural panels) are installed so that the openings are not more than 19 inches (48 cm) wide.
- J Guardrail systems must be able to withstand an outward or downward force of at least 200 pounds.
- J Midrails, screens, mesh, intermediate vertical members, solid panels, etc., must be able to withstand an outward or downward force of at least 150 pounds.
- J The ends of top rails and midrails must not overhang the terminal posts if they pose a projection hazard.

- J Steel banding and plastic banding must not be used for top rails or midrails.
- J Top rails and midrails must be at least 0.25-inches (0.6 cm) in diameter or in thickness.
- J When guardrail systems are used at hoist areas, a removable guardrail section must be placed across the access opening when employees are not performing hoisting operations.
- J When guardrail systems are used around holes, they must be installed on all unprotected sides or edges of the hole.
- J When materials are passed through holes, at least two sides of the hole must be protected by guardrails.
- J When guardrail systems are used around holes that serve as points of access (such as ladderways), the guardrail system opening must have a self-closing gate or be offset to prevent an employee from walking into the hole.

Note: The criteria and practices requirements for guardrail systems on scaffolds are contained in [29 CFR part 1926, subpart L](#).

Safety Net Systems

The employer must ensure each safety net system meets the requirements in [29 CFR part 1926, subpart M](#).

7. The top edge height of top rails must be _____, above the walking-working surface.

- a. between 43 inches and 45 inches
- b. 42 inches, plus or minus 3 inches
- c. at least 39 inches
- d. no higher than 46 inches

Stairways

The employer must ensure the following:

- J Each employee exposed to an unprotected side or edge of a stairway landing that is 4 feet (1.2 m) or more above a lower level is protected by a guardrail or stair rail system;

-) Each ship stairs and alternating tread type stairs is equipped with handrails on both sides; and
-) Each flight of stairs having at least 3 treads and at least 4 risers is equipped with stair rail systems and handrails according to the table below:

| Stair width | Enclosed | One open side | Two open sides | With earth built up on both sides |
|---|---|---|--|-----------------------------------|
| Less than 44 inches (1.1 m) | At least one handrail | One stair rail system with handrail on open side | One stair rail system each open side | |
| 44 inches (1.1 m) to 88 inches (2.2 m) | One handrail on each enclosed side | One stair rail system with handrail on open side and one handrail on enclosed side | One stair rail system with handrail on each open side | |
| Greater than 88 inches (2.2 m) | One handrail on each enclosed side and one intermediate handrail located in the middle of the stair | One stair rail system with handrail on open side, one handrail on enclosed side, and one intermediate handrail located in the middle of the stair | One stair rail system with handrail on each open side and one intermediate handrail located in the middle of the stair | |
| Exterior stairs less than 44 inches (1.1 m) | | | | One handrail on least one side |

Note to table: The width of the stair must be clear of all obstructions except handrails.

8. Each employee exposed to an unprotected side or edge of a stairway landing that _____ is protected by a guardrail or stair rail system.

- a. is 6 feet (1.8) or greater above a lower level
- b. has 3 treads and less than 4 risers
- c. is 4 feet (1.2 m) or more above a lower level
- d. has at least 4 treads and 6 risers

Handrails and Stair Rail Systems

A handrail is a horizontal or sloping rail intended for grasping by the hand for guidance or support. A stair rail is a guard along the open side or sides of a stairway.

The employer must ensure:

Height criteria

-) Handrails are not less than 30 inches (76 cm) and not more than 38 inches (97 cm), as measured from the leading edge of the stair tread to the top surface of the handrail.
-) The height of stair rail systems meets the following:
 - o The height of stair rail systems installed before January 17, 2017 is not less than 30 inches (76 cm) from the leading edge of the stair tread to the top surface of the top rail; and
 - o The height of stair rail systems installed on or after January 17, 2017 is not less than 42 inches (107 cm) from the leading edge of the stair tread to the top surface of the top rail.

The top rail of a stair rail system may serve as a handrail only when:

-) The height of the stair rail system is not less than 36 inches (91 cm) and not more than 38 inches (97 cm) as measured at the leading edge of the stair tread to the top surface of the top rail; and
-) The top rail of the stair rail system meets the other handrail requirements above.

9. What is the minimum height of stair rail systems installed on or after January 17, 2017?

- a. 30 inches
- b. 36 inches
- c. 39 inches
- d. 42 inches

Cages, Wells, and Platforms Used With Fixed Ladders

The employer must ensure:

-) Cages and wells installed on fixed ladders are designed, constructed, and maintained to permit easy access to, and egress from, the ladder that they enclose;
-) Cages and wells are continuous throughout the length of the fixed ladder, except for access, egress, and other transfer points;
-) Cages and wells are designed, constructed, and maintained to contain employees in the event of a fall, and to direct them to a lower landing; and
-) Platforms used with fixed ladders provide a horizontal surface of at least 24 inches by 30 inches (61 cm by 76 cm).

Outdoor Advertising

This section applies only to employers engaged in outdoor advertising operations. Employers must ensure that each employee who climbs a fixed ladder without fall protection:

-) Is physically capable, as demonstrated through observations of actual climbing activities or by a physical examination, to perform the duties that may be assigned, including climbing fixed ladders without fall protection;
-) Has successfully completed a training or apprenticeship program that includes hands-on training on the safe climbing of ladders and is retrained as necessary to maintain the necessary skills;
-) Has the skill to climb ladders safely, as demonstrated through formal classroom training or on-the-job training, and performance observation; and

-) Performs climbing duties as a part of routine work activity.

10. Fixed ladder cages and wells are designed, constructed, and maintained ____.

- a. to contain employees in the event of a fall
- b. to provide a resting area during the climb
- c. to hold at least two climbers simultaneously
- d. to provide hands-free vertical movement

Fixed Ladder Safety Systems

The employer must ensure:

-) Each ladder safety system allows the employee to climb up and down using both hands and does not require that the employee continuously hold, push, or pull any part of the system while climbing;
-) The connection between the carrier or lifeline and the point of attachment to the body harness or belt does not exceed 9 inches (23 cm);
-) Mountings for rigid carriers are attached at each end of the carrier, with intermediate mountings spaced, as necessary, along the entire length of the carrier so the system has the strength to stop employee falls;
-) Mountings for flexible carriers are attached at each end of the carrier and cable guides for flexible carriers are installed at least 25 feet (7.6 m) apart but not more than 40 feet (12.2 m) apart along the entire length of the carrier;
-) The design and installation of mountings and cable guides does not reduce the design strength of the ladder; and
-) Ladder safety systems and their support systems are capable of withstanding, without failure, a drop test consisting of an 18-inch (41-cm) drop of a 500-pound (227-kg) weight.

Personal Fall Protection Systems

Body belts, harnesses, and other components used in personal fall arrest systems, work positioning systems, and travel restraint systems must meet the requirements of [OSHA Standard 1910.140, Personal fall protection systems](#).

11. Each ladder safety system should allow the employee ____.

- a. continuously hold, push, or pull on the system as needed
- b. to drop no more than 12 inches
- c. to climb up and down using both hands
- d. extend the connection length to 18 inches

Protection From Falling Objects

The employers must ensure toeboards used for falling object protection:

-) Are erected along the exposed edge of the overhead walking-working surface for a length that is sufficient to protect employees below.
-) Have a minimum vertical height of 3.5 inches (9 cm) as measured from the top edge of the toeboard to the level of the walking-working surface. Two-by-four inch lumber meets this requirement.
-) Do not have more than a 0.25-inch (0.5-cm) clearance or opening above the walking-working surface.
-) Are solid or do not have any opening that exceeds 1 inch (3 cm) at its greatest dimension.
-) Have a minimum height of 2.5 inches (6 cm) when used around vehicle repair, service, or assembly pits. Toeboards may be omitted around vehicle repair, service, or assembly pits when the employer can demonstrate that a toeboard would prevent access to a vehicle that is over the pit.
-) Are capable of withstanding, without failure, a force of at least 50 pounds (222 N) applied in any downward or outward direction at any point along the toeboard.

-) Where tools, equipment, or materials are piled higher than the top of the toeboard, paneling or screening is installed from the toeboard to the midrail of the guardrail system and for a length that is sufficient to protect employees below. If the items are piled higher than the midrail, the employer also must install paneling or screening to the top rail and for a length that is sufficient to protect employees below; and
-) All openings in guardrail systems are small enough to prevent objects from falling through the opening.
-) The employer must ensure canopies used for falling object protection are strong enough to prevent collapse and to prevent penetration by falling objects.

Grab Handles

The employer must ensure each grab handle:

-) Is not less than 12 inches (30 cm) long;
-) Is mounted to provide at least 3 inches (8 cm) of clearance from the framing or opening; and
-) Is capable of withstanding a maximum horizontal pull-out force equal to two times the maximum intended load or 200 pounds (890 N), whichever is greater.

12. What must the minimum vertical height of scaffold toeboard be to prevent objects from falling off the scaffold?

- a. 2 inches
- b. 3.5 inches
- c. 5 inches
- d. 2.5 inches

Additional Resources

-) [1910 Subpart D, Walking-Working Surfaces](#) - OSHA
-) [1910 Subpart I, Personal Protective Equipment](#) - OSHA
-) [Interactive Ladder Safety Mobile Application](#), NIOSH
-) [Napo's Films](#), Via Storia