Scaffolding can give employees an efficient and safe means to perform work. However, unsafe scaffolding procedures can cause injuries and even death. This course discusses the general requirements of scaffolding. It will also show employees that planning ahead for the erection, use, and dismantling of scaffolding can help prevent serious injuries.
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OSHAcademy Course 604 Study Guide

Scaffold Safety

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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 604.

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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Course Introduction

Scaffolding can give people an efficient and safe means to perform work. It also has many applications. Scaffolding is used in construction, alteration, routine maintenance, and renovation. When properly erected and maintained, scaffolding provides workers a safe access to work areas, level and stable working platforms, and temporary storage for tools and materials.

However, unsafe scaffolding procedures can cause accidents, serious injuries and even death. Accidents involving scaffolding mainly involve workers falling, incorrect operating procedures, environmental conditions, and falling materials.

This course will discuss the general requirements of scaffolding, the basic parts of a scaffold as well as the different types of scaffolding. It will show employees that planning ahead for the erection, use and dismantling of scaffolding can decrease the potential for accidents and injuries. It will discuss the precautions to prevent these serious accidents and protect workers against fall injuries and death.
Module 1: Scaffolding Basics

Introduction

When scaffolds are not erected or used properly, fall hazards can occur. About 2.3 million construction workers frequently work on scaffolds. Protecting these workers from scaffold-related accidents would prevent an estimated 4,500 injuries and over 50 fatalities each year.

When OSHA revised its scaffolds standard back in 1996, the Bureau of Labor and Statistics (BLS) showed that 25% of workers injured in scaffold accidents had not received any scaffold training. Also, 77% of scaffolds were not equipped with guardrails to keep workers safe.

In a recent BLS study, 72% of workers injured in scaffold accidents say the accident was caused by either planking or support giving way, employees slipping on surfaces, or employees being struck by falling objects.

Scenario

On October 12, 1993, a 53-year-old male mason was fatally injured when he fell approximately twelve feet from the second level of an unguarded tubular welded scaffold system. It is not known what the victim was doing at the time of the incident; however, a witness saw him walk to the edge of the scaffold and place his foot on a piece of iron scaffold bracing. He either tripped or lost his balance and fell to the sand covered asphalt below. The victim was transported to the local hospital where he died approximately two hours later. Investigators concluded that in order to prevent similar future occurrences, employers should:

- Install guardrails on all open sides of scaffolds which are more than ten feet above ground.
- Ensure that scaffolding is properly erected, maintained, moved, dismantled and/or altered only under the supervision of a competent person.
- Develop and implement a comprehensive safety program that includes, but is not limited to, training in fall hazard recognition and the use of fall protection devices.

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. Each of the following events contribute to most scaffold accidents EXCEPT ______.
   a. planking or supports giving way
   b. employee slipping on surfaces
   c. falling through defective guardrails
   d. being struck by a falling object

What is a Scaffold?

A scaffold is defined as an elevated, temporary work platform. There are three basic types of scaffolds:

1. Supported scaffolds, which consist of one or more platforms supported by rigid, load-bearing members, such as poles, legs, frames, outriggers, etc.
2. Suspended scaffolds, which are one or more platforms suspended by ropes or other non-rigid, overhead support.
3. Other scaffolds, principally man lifts, personnel hoists, etc., which are sometimes thought of as vehicles or machinery, but can be regarded as another type of supported scaffold.

We will cover the common supported and suspended scaffold types. Here is a more complete list of scaffold types:

- Single-pole wood pole scaffolds
- Independent wood pole scaffolds
- Tube and coupler scaffolds
- Fabricated frame scaffolds
- Plasterers', decorators' and large area scaffolds
- Bricklayers' square scaffolds
- Horse scaffolds
- Form scaffolds and carpenters' bracket scaffolds
- Roof bracket scaffolds
- Outrigger scaffolds (one level)
- Pump jack scaffolds
- Ladder jack scaffolds
- Window jack scaffolds
- Crawling boards (chicken ladders)
- Step, platform and trestle ladder scaffolds
- Single-point adjustable suspension scaffolds
Two-point adjustable suspension scaffolds
Stonesetters’ multi-point adjustable suspension scaffolds
Masons’ multi-point adjustable suspension scaffolds
Catenary scaffolds
Float (ship) scaffolds
Interior hung scaffolds
Needle beam scaffolds
Multi-level suspension scaffolds
Mobile scaffolds
Repair bracket scaffolds
Stilts
Tank builders’ scaffolds

2. Which of the following is NOT one of the three basic types of scaffolds?
   a. Supported scaffolds
   b. Articulating scaffolds
   c. Suspended scaffolds
   d. Other scaffolds

Who Uses Scaffolds

Workers on scaffolds can be divided into two groups, erectors/dismantlers and users:

1. Erectors/Dismantlers

Erectors and dismantlers are those workers who are mainly responsible for assembling and disassembling scaffolding. This is done before other work can continue, and/or after work has been completed.

Training Requirements

OSHA requires employers to provide training by a competent person to each employee who is involved in erecting and/or disassembling a scaffold.

A qualified person must do adequate preplanning to make sure the scaffold is erected properly.

Preplanning includes:

- Determining the type of scaffold necessary for the job,
- Determining the maximum load of the scaffold,
• Assuring a good foundation, and
• Avoiding electrical hazards.

2. Users

Scaffold users are those whose work requires them, at least some of the time, to be supported by scaffolding. Employers are required to have a qualified person provide training to each employee who uses the scaffold. The training must teach employees to recognize the hazards associated with the type of scaffold being used. They must also understand the procedures to control or minimize those hazards. Here are a few of the hazards:

• Falls from elevation, due to lack of fall protection;
• Collapse of the scaffold, caused by instability or overloading;
• Being struck by falling tools, work materials, or debris; and
• Electrocution, principally due to proximity of the scaffold to overhead power lines.

Scenario

In August 1992, two workers were erecting an aluminum pump jack scaffold. As they were raising the second aluminum pole, the pole apparently contacted an overhead power line. The pole being raised was 29 feet 10 inches long and the line was 28 feet 10 inches high. The line was approximately 11 feet from the house. One employee died and the other suffered severe burns and was hospitalized. The surviving employee noted that he thought they had enough room to work around the power lines, which were not de-energized or shielded.

3. Each of the following is a category of scaffold worker EXCEPT _____.

   a. dismantler
   b. installer
   c. user
   d. inspector
Scaffolding Terms

It’s important to know some of the common terms when dealing with scaffolding. For example, when an employee goes from one job site to another, knowing the proper scaffolding terms will improve communications and safety.

For a more complete list of terms with definitions, see OSHA’s 1926.450, Scaffolds.

Here are some definitions for the more common scaffold types:

1. **Anchorage**: A secure point of attachment for lifelines, lanyard, deceleration devices or tiebacks.

2. **Base Plate**: A device used to distribute vertical load.

3. **Bearer**: A horizontal member of a scaffold upon which the platform unit rests and that may be supported by runners.

4. **Boatswains’ Chair**: A suspended seat designed to accommodate one worker in a sitting position.

5. **Body Harness, Full**: Straps that are secured about an employee in a manner that distributes the arresting forces over at least the thighs, shoulders and pelvis with provisions for attaching a lanyard, lifeline or deceleration device.

6. **Brace**: A device that holds one scaffold member in a fixed position with respect to another member.

7. **Competent Person**: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous or dangerous to employees, and who has the authority to take prompt corrective measures to eliminate such hazards.

8. **Crossbraces**: Two diagonal scaffold members joined at their center to form an “X.” Used between frames or uprights or both.

9. **Design Load**: The maximum intended load; that is, the total of all loads including the worker(s), material and the equipment placed on the unit.

10. **Electrical Ground**: A conducting connection between an electrical circuit or equipment and the area, or some conducting body that serves in place of the earth.

11. **Fall Protection**: A system designed to prevent or arrest a person’s fall.
12. **Guardrail System**: A rail system erected along the open sides and ends of platforms. The rail system consists of a toprail and midrail and their supports.

13. **Guy**: A rope, chain or cable used to stabilize a vertical object.

14. **Hoist**: A device intended to be used to raise and lower a suspended scaffold. It may be either manually operated or power-operated.

15. **Lanyard**: A flexible line to secure the wearer of a full body harness to a lifeline, trolley line or a fixed anchor.

16. **Maximum Intended Load**: The total load of all workers, equipment, tools and materials.

17. **Midrail**: A rail approximately midway between the toprail and platform of a guardrail system.

18. **Open Sides and Ends**: That portion of a scaffold platform unit that is not protected by a guardrail system, crossbraces, vertical work surfaces or stirrups.

19. **Personal Fall Arrest System**: An assembly of components and subsystems used to arrest a person in a fall from a working height.

20. **Plank**: A wood board and fabricated component that serves as a platform unit.

21. **Plank (Metal)**: A metal platform unit sized to support one or more workers or uniformly distributed loads. Metal planks would be similar dimensions as wood planks.

22. **Plank (Wood, Laminated)**: A platform unit of glue-laminated wood whose method of manufacture and assigned design values contemplate flat use in a scaffolding application.

23. **Plank (Wood, Sawn)**: A board of sawn lumber whose grading rules and assigned design values contemplate flat use in a scaffolding application.

24. **Platform**: A general term for an elevated work surface composed of one or more platform units.

25. **Qualified Person**: One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training or experience has successfully demonstrated the ability to solve or resolve problems related to the subject matter, the work or the project.

26. **Rated Load**: The manufacturer’s recommended maximum load.
27. **Runner**: A horizontal scaffold member that forms a tie between posts and may also support a bearer.

28. **Safety Screen**: A wire or plastic screening that protects the workers and passers-by below from dropped items.

29. **Scaffold**: A temporary elevated or suspended work unit and its supporting structure used for supporting worker(s) or materials, or both.

30. **Sill**: A footing (usually wood) which distributes the vertical loads to the ground or slab below.

31. **Tie**: A device used between scaffold component and the building or structure to enhance lateral stability.

32. **Toeboard**: A barrier secured along the sides and the ends of a platform unit to guard against the falling of material, tools and other loose objects.

33. **Toprail**: The uppermost horizontal rail of a guardrail system.

34. **Working Load**: Load imposed by persons, materials and equipment.

You can test your scaffolding vocabulary with an online crossword puzzle. It requires an Adobe Flash Player.

**4. Which of the following scaffold terms means a work surface elevated above lower levels?**

- a. Platform
- b. Landing
- c. Running board
- d. Walkway

**General Requirements in 1926.451**

OSHA's scaffolding standard has number of key provisions:

- **Fall protection or fall arrest systems** -- Each employee more than 10 feet above a lower level shall be protected from falls by guardrails or a fall arrest system, except those on single-point and two-point adjustable suspension scaffolds. Each employee on a single-point and two-point adjustable suspended scaffold shall be protected by both a personal fall arrest system and a guardrail. 1926.451(g)(1)
• **Guardrail height** -- The height of the toprail for scaffolds manufactured and placed in service after January 1, 2000 must be between 38 inches (0.9 meters) and 45 inches (1.2 meters). The height of the toprail for scaffolds manufactured and placed in service before January 1, 2000 can be between 36 inches (0.9 meters) and 45 inches (1.2 meters). 1926.451(g)(ii)

• **Crossbracing** -- When the crosspoint of crossbracing is used as a toprail, it must be between 38 inches (0.97 m) and 48 inches (1.3 meters) above the work platform. 1926.451(g)(4)(xv)

• **Midrails** -- Midrails must be installed approximately halfway between the toprail and the platform surface. When a crosspoint of crossbracing is used as a midrail, it must be between 20 inches (0.5 meters) and 30 inches (0.8 m) above the work platform. 1926.451(g)(4)

• **Footings** -- Support scaffold footings shall be level and capable of supporting the loaded scaffold. The legs, poles, frames, and uprights shall bear on base plates and mud sills. 1926.451(c)(2)

• **Platforms** -- Supported scaffold platforms shall be fully planked or decked. 1926.451(b)

• **Guying ties, and braces** -- Supported scaffolds with a height-to-base of more than 4:1 shall be restrained from tipping by guying, tying, bracing, or the equivalent. 1926.451(c)(1)

• **Capacity** -- Scaffolds and scaffold components must support at least 4 times the maximum intended load. Suspension scaffold rigging must at least 6 times the intended load. 1926.451(a)(1) and (3)

• **Training** -- Employers must train each employee who works on a scaffold on the hazards and the procedures to control the hazards. 1926.454

• **Inspections** -- Before each work shift and after any occurrence that could affect the structural integrity, a competent person must inspect the scaffold and scaffold components for visible defects. 1926.451(f)(3)

• **Erecting and Dismantling** -- When erecting and dismantling supported scaffolds, a competent person must determine the feasibility of providing a safe means of access and fall protection for these operations. 1926.451(e)(9) & (g)(2)

### 5. Scaffolds and scaffold components must support _____.

- a. up to twice the actual load
- b. 3 times the potential load
- c. at least 4 times the intended load
- d. 10 times the expected load
Competent Persons

OSHA's scaffolding standard defines a competent person as "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions, which are unsanitary, hazardous to employees, and who has authorization to take prompt corrective measures to eliminate them."

The standard requires a competent person to perform the following duties under these circumstances:

- Select and direct employees who erect, dismantle, move, or alter scaffolds.
- Determine if it is safe for employees to work on or from a scaffold during storms or high winds and to ensure that a personal fall arrest system or wind screens protect these employees.
- Train employees involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting scaffolds to recognize associated work hazards.
- Inspect scaffolds and scaffold components for visible defects before each work shift and after any occurrence which could affect the structural integrity and to authorize prompt corrective actions.
- Inspect ropes on suspended scaffolds prior to each work shift and after every occurrence which could affect the structural integrity and to authorize prompt corrective actions.
- Inspect manila or plastic (or other synthetic) rope being used for toprails or midrails.
- For Suspension Scaffolds: evaluate direct connections to support the load and evaluate the need to secure two-point and multi-point scaffolds to prevent swaying.
- For Erectors and Dismantlers: determine the feasibility and safety of providing fall protection and access, and train erectors and dismantlers to recognize associated work hazards.
- For Scaffold Components: determine if a scaffold will be structurally sound when intermixing components from different manufacturers and determine if galvanic action has affected the capacity when using components of dissimilar metals.

6. Who must conduct scaffold training in erecting, disassembling, operating, repairing, and maintaining scaffolds?

   a. A designated person
   b. A qualified person
   c. An authorized person
   d. A competent person
**Qualified Persons**

The scaffold standard defines a qualified person as "one who -- by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience -- has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project."

The qualified person must perform the following duties in these circumstances:

- Design and load scaffolds in accordance with that design.
- Train employees working on the scaffolds to recognize the associated hazards and understand procedures to control or minimize those hazards.
- Design the rigging for single-point adjustable suspension scaffolds.
- Design platforms on two-point adjustable suspension types that are less than 36 inches (0.9 m) wide to prevent instability.
- Make swaged attachments or spliced eyes on wire suspension ropes.
- Design scaffold components construction in accordance with the design.

**Registered Engineers**

A "Registered Professional Engineer" is a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of OSHA standards.

The scaffold standard requires a registered professional engineer to perform the following duties in these circumstances:

- Design the direct connections of masons’ multi-point adjustable suspension scaffolds.
- Design scaffolds that are to be moved when employees are on them.
- Design pole scaffolds over 60 feet (18.3 meters) in height.
- Design tube and coupler scaffolds over 125 feet (38 meters) in height.
- Design fabricated frame scaffolds over 125 feet (38 meters) in height above their base plates. 1926.452(c)(6)
- Design brackets on fabricated frame scaffolds used to support cantilevered loads in addition to workers.
- Design outrigger scaffolds and scaffold components.
7. Who is responsible for training scaffold workers how to recognize hazards and understand procedures?
   a. A registered engineer
   b. A qualified person
   c. An authorized person
   d. A competent person

Training Requirements

Scope of Training

The employer must have each employee who performs work while on a scaffold trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards. The training must include the following areas, as applicable: 1926.454(a).

Here are some mandatory scaffold training topics:

- fall hazards and falling object hazards in the work area;
- procedures for dealing with electrical hazards;
- erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used;
- proper use of the scaffold, and the proper handling of materials on the scaffold;
- the maximum intended load-carrying capacities of the scaffold, and
- any other pertinent requirements of the standard.

Trainer Qualifications

A competent person must train all employees who erect, disassemble, move, operate, repair, maintain, or inspect scaffolds.

To be considered a competent person trainer, the employee should have:

- adequate practical experience and knowledge of the topics being taught;
- necessary skills to demonstrate safe procedures and practices;
- adequate skills to train, test, and evaluate student knowledge, skills, and abilities (KSAs);
- passed an evaluation of training KSAs; and
- received certification and authorization by the employer to conduct the training.


**Retraining**

When the employer has reason to believe that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, the employer must retrain each such employee so that the requisite proficiency is regained.

Retraining should be accomplished when the following conditions exist:

- where changes at the worksite present a hazard about which an employee has not been previously trained; or
- where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained; or
- where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.

**Recommended Training Topics**

Scaffold erectors and dismantlers should all receive the general overview, and, in addition, specific training for the type of supported scaffold being erected or dismantled.

- general/specific regulations and standards as applicable
- erection/dismantling planning
- PPE and proper procedures
- general/specific fall protection as applicable
- materials handling
- components
- parts inspection
- general and specific safety as applicable
- access and platforms
- working platforms
- foundations
- buttresses, cantilevers, & bridges
- guys, ties and braces
- rolling scaffold assembly
- putlogs
8. Which of the following is NOT a mandatory scaffold erector and dismantler training topic?

   a. Electrical hazards
   b. Scaffold parts inspection
   c. Maximum intended load requirements
   d. Fall hazards and falling object hazards


Module 2: Supported Scaffolds

Supported scaffolds consist of one or more platforms supported by legs, outrigger beams, brackets, poles, uprights, posts, frames, or similar rigid support. 1926.451(b)

Frame or Fabricated

Fabricated frame scaffolds are the most common type of scaffold because they are versatile, economical, and easy to use. They are frequently used in one or two tiers by residential contractors, painters, etc., but their modular frames can also be stacked several stories high for use on large-scale construction jobs. More information on this scaffold.

Tube and Coupler

Tube and coupler scaffolds are so-named because they are built from tubing connected by coupling devices. Due to their strength, they are frequently used where heavy loads need to be carried, or where multiple platforms must reach several stories high. Their versatility, which enables them to be assembled in multiple directions in a variety of settings, also makes them hard to build correctly. More information on this scaffold.

1. What is the most common supported scaffold?
   a. Pole or wood pole
   b. Mast climber
   c. Tube and coupler
   d. Fabricated

Pole or Wood Pole

Pole scaffolds are a type of supported scaffold in which every structural component, from uprights to braces to platforms, is made of wood. OSHA has standards for two kinds: single-pole, which are supported on their interior side by a structure or wall, and double-pole, which are supported by double uprights independent of any structure.

Pole scaffolds are old-fashioned and are rarely used today because they have to be built from scratch and cannot be reused. More information on this scaffold.

Mast Climbers

Mast climbing supported scaffolds (mast climbers) carry much heavier loads than traditional scaffolding and are used to position personnel and the necessary tools, equipment, and materials needed to perform work at great heights.
Mast climbers can be free-standing or tied to a structure at intervals for stability at increased heights. The mast may be supported on a stationary base, or for some projects that are lower, on a mobile base. Because mast climbers may be easily adjusted to optimize working heights, they can reduce the potential for shoulder and lower back injuries to workers. Proper platform positioning reduces material handling hazards and fatigue and improves productivity. More information on this scaffold.

2. Which type of supported scaffold can carry much heavier loads than traditional scaffolding?
   - Wood pole
   - Mast climber
   - Fabricated
   - Tube and coupler

Ladder Jack

A ladder jack scaffold is a system designed to perform activities, such as: installing building exteriors, trim, and finishes. Contractors widely use ladder jack scaffolds because of their cost effectiveness, portability, and quick erection and dismantling procedures, as well as their adaptability for use in narrow spaces at construction worksites. More information on this scaffold.

Pump Jack

Pump jacks are uniquely designed scaffolds consisting of a platform supported by movable brackets on vertical poles. The brackets are designed to be raised and lowered in a manner similar to an automobile jack. Pump jacks are appealing for certain applications because they can be easily adjusted to variable heights and are relatively inexpensive. More information on this scaffold.

Real Life Scenario

In August 1992, two workers were erecting an aluminum pump jack scaffold. As they were raising the second aluminum pole, the pole apparently contacted an overhead power line. The pole being raised was 29 feet 10 inches long and the line was 28 feet 10 inches high. The line was approximately 11 feet from the house. One employee died and the other suffered severe burns and was hospitalized. The surviving employee noted that he thought they had enough room to work around the power lines, which were not de-energized or shielded.
3. Which of the following supported scaffolds consists of a platform supported by moveable brackets on vertical poles?

   a. Mast climbing scaffolds  
   b. Outrigger scaffolds  
   c. Pump jack scaffolds  
   d. Ladder jack scaffolds

Mobile (Manually or Propelled)

Mobile scaffolds are a type of supported scaffold set on wheels or casters. They are designed to be easily moved and are commonly used for things like painting and plastering, where workers must frequently change position. More information on this scaffold.

Specialty and Other

Many scaffold types regulated by OSHA standards are rarely used and designed for a very narrow and specific range of applications. Specialty scaffolds include:

- Plasterers', Decorators', and Large-Area Scaffolds
- Bricklayers' Square Scaffolds
- Horse Scaffolds
- Form Scaffolds and Carpenters' Bracket Scaffolds
- Roof Bracket Scaffolds
- Outrigger Scaffolds
- Window Jack Scaffolds
- Crawling Boards (Chicken Ladders)
- Step, Platform, and Trestle Ladder Scaffolds
- Stilts

4. Which of the following types of scaffolds are commonly used for painting and plastering?

   a. Mobile scaffolds  
   b. Ladder jack scaffolds  
   c. Roof bracket scaffolds  
   d. Trestle ladder scaffolds
Criteria for Supported Scaffolds

Foundations

Supported scaffolds' poles, legs, posts, frames, and uprights must bear on base plates and mud sills, or other adequate firm foundation. 1926.451(c)(2)(i) and (ii)

Restraining

Supported scaffolds with a height to base width ratio of more than 4:1 must be restrained by guying, tying, bracing, or an equivalent means. 1926.451(c)(1)

Either the manufacturers' recommendation or the following placements must be used for guys, ties, and braces:

- Install guys, ties, or braces at the closest horizontal member to the 4:1 height and repeat vertically with the top restraint no further than the 4:1 height from the top.
- Vertically -- every 20 feet (6.1 meters) or less for scaffolds less than three feet (0.91 meters) wide; every 26 feet (7.9 meters) or less for scaffolds more than three feet (0.91 meters) wide.
- Horizontally -- at each end; at intervals not to exceed 30 feet (9.1 meters) from one end. 1926.451(c)(1)

5. Supported scaffolds must be restrained by guying, tying, bracing, or an equivalent means when _____.
   a. unfavorable weather conditions are expected
   b. more than three employees work on the scaffold
   c. the scaffold is located next to a public walkway
   d. the height to base width ratio is more than 4:1

Forklifts, Front-end Loaders, or Similar Equipment Support Platforms

Forklifts can support platforms only when the entire platform is attached to the fork and the forklift does not move horizontally when workers are on the platform. 1926.451(c)(2)(v)

Front-end loaders and similar equipment can support scaffold platforms only when they have been specifically designed by the manufacturer for such use. 1926.451(c)(2)(iv)
Increasing Working Heights

OSHA prohibits using "makeshift" objects (e.g., saw horses, buckets, milk crates, concrete blocks, etc.) to increase the working height of a scaffold, because an unstable platform increases the likelihood of collapse or a fall.

**Stilts** means a pair of poles or similar supports with raised footrests, used to walk above the ground or above the working surface. Stilts are often used for sheetrock installation as well as for painting and decorating and other tasks requiring walking mobility with increased height/reach. They may also be used on a large-area scaffold. When a guardrail system is used, the guardrail height must be increased in height equal to the height of the stilts. The manufacturer must approve any alterations to the stilts. 1926.452(v)

**Note:** A large area scaffold consists of a pole, tube and coupler systems, or a fabricated frame scaffold erected over substantially the entire work area. 1926.451(b)

6. Which of the following objects may be used to increase the working height on supported large-area scaffolds?
   
   - a. Pallets
   - b. Stilts
   - c. Saw horses
   - d. Concrete blocks

Access Requirements

Employers must provide access when the scaffold platforms are more than 2 feet (0.6 meters) above or below a point of access. 1926.451(e)(1)

Direct access is acceptable when the scaffold is not more than 14 inches (36 centimeters) horizontally and not more than 24 inches (61 centimeters) vertically from the other surfaces. 1926.451(e)(8)

The standard prohibits the use of crossbraces as a means of access. 1926.451(e)(1)

What types of access can be used?

Several types of access are permitted:

- Ladders, such as portable, hook-on, attachable, and stairway 1926.451(e)(2),
- Stair towers 1926.451(e)(4),
- Ramps and walkways 1926.451(e)(5), and
• Integral prefabricated frames (1926.451(e)(6)).

Access While Erecting and Dismantling Supported Scaffolds?

Employees erecting and dismantling supported scaffolding must have a safe means of access provided when a competent person has determined the feasibility and analyzed the site conditions. 1926.451(e)

7. All of the following are permitted methods of access to scaffolds EXCEPT _____.
   a. crossbraces
   b. ramps and walkways
   c. stair towers
   d. ladders

Use Requirements

Prohibited Scaffolds

Shore and lean-to scaffolds are strictly prohibited. 1926.451(f)(2)

Also, employees are prohibited from working on scaffolds covered with snow, ice, or other slippery materials, except to remove these substances. 1926.451(f)(8)

The shore scaffold in the image to the right is not permitted to be used per OSHA or ANSI. In this picture, the workers have a shore scaffold on top of another shore scaffold. Access is unsafe both from above and below. The only thing holding this scaffold up is the DUMPSTER!

Clearance Distances

Scaffolds must not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than as follows: 1926.451(f)(6)

The table below lists clearing distances:

Insulated Lines
### Minimum Distance and Alternatives for Voltage to Minimum Distance

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Minimum Distance</th>
<th>Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 300 volts</td>
<td>3 feet</td>
<td>-</td>
</tr>
<tr>
<td>300 volts to 50 kilovolts (kV)</td>
<td>10 feet</td>
<td>-</td>
</tr>
<tr>
<td>More than 50 kV</td>
<td>10 feet plus 0.4 inches for each 1 kV more than 50 kV</td>
<td>2 times the length of the line insulator, but never less than 10 feet</td>
</tr>
</tbody>
</table>

### Uninsulated Lines

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Minimum Distance</th>
<th>Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 50 kV</td>
<td>10 feet</td>
<td>-</td>
</tr>
<tr>
<td>More than 50 kV</td>
<td>10 feet plus 0.4 inches for each 1 kV more than 50 kV</td>
<td>2 times the length of the line insulator, but never less than 10 feet</td>
</tr>
</tbody>
</table>

### Question 8
Which of the following types of scaffolds is strictly prohibited by OSHA?

- a. Ladder jack scaffolds
- b. Shore and lean-to scaffolds
- c. Large-area scaffolds
- d. Chicken ladder scaffolds

### Fall Protection

Workers must be protected from falling and from being injured from falling objects.

Guardrails must be installed on all scaffold platforms in accordance with [OSHA 1910.451](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=20315) and at least consist of top rails, midrails and toeboards.

### Fall Protection Systems

Workers on suspended scaffolds must use a fall protection system to protect them against scaffold failure. This system will usually consist of a full body harness, lanyard, rope grab, independent vertical lifeline and an independent lifeline anchorage. Remember, fall protection is only as good as its anchorage. The anchorage points are independent points on structures where lifelines are securely attached. These points must be able to support at least 5,000 pounds per employee.
Protection from Falling Objects

Workers and others located at lower levels need to be protected from objects falling off scaffolds using the following methods:

- **Toeboards.** Toeboards must be installed on platforms higher than 10 feet above lower levels, at 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.
- **Canopies.** Make sure canopies won't collapse or tear from an object's impact.

9. Employers must provide fall protection for each employee on a scaffold _____.
   
   a. more than 4 feet above ground level  
   b. 6 feet or more above the ground  
   c. more than 10 feet above a lower level  
   d. if the working surface is 12 feet above a lower level
Module 3: Suspension Scaffold, Lifts, and Hoists

Suspended Scaffolds

A suspension scaffold contains one or more platforms suspended by ropes or other non-rigid means from an overhead structure, such as the following scaffolds: single-point, multipoint, multi-level, two-point, adjustable, boatswain's chair, catenary, chimney hoist, continuous run, elevator false car, go-devils, interior hung, masons', and stone setters. We will discuss 8 of the general types of suspension scaffolds, lifts, and hoists. 1926.450(b)

Single-Point Adjustable

A single-point adjustable scaffold consists of a platform suspended by one rope from an overhead support and equipped with means to allow movement of the platform to desired work levels. The most common among these is the scaffold used by window washers to clean the outside of a skyscraper (also known as a boatswain's chair). More information on this scaffold.

Two-Point Swing Stage

The two-point adjustable suspension scaffold, also known as a swing-stage scaffold, is perhaps the most common type of suspended scaffold. Hung by ropes or cables connected to stirrups at each end of the platform, it is typically used by window washers on skyscrapers, but plays a prominent role in high-rise construction as well. More information on this scaffold.

1. What is the most common type of suspension scaffold used?
   a. Single-point swing stage
   b. Two-point swing stage
   c. Multi-point
   d. Multi-level adjustable

Multi-Level

A multi-level scaffold is a two-point or multi-point adjustable suspension scaffold with a series of platforms at various levels resting on common stirrups. More information on this scaffold.

Multi-point Adjustable

A multi-point adjustable scaffold consists of a platform (or platforms) suspended by more than two ropes from overhead supports and equipped with means to raise and lower the platform(s)
to desired work levels. These scaffolds have many uses in tanks, silos, stacks, and chimneys. More information on this scaffold.

2. Which of the following scaffolds consists of a platform (or platforms) suspended by more than two ropes from overhead supports?

   a. A multi-level supported scaffold
   b. A multi-point adjustable scaffold
   c. A multi-tie adjustable scaffold
   d. A multiple lift adjustable scaffold

Float (Ship)

A float, or ship, scaffold is a suspension scaffold consisting of a braced platform resting on at least two parallel bearers extending at least 6 inches beyond the platform on both sides. The platform is hung from overhead supports by ropes of fixed length. The More information on this scaffold.

Needle Beam

This simple type of scaffold consists of a platform suspended from needle beams, usually attached on one end to a permanent structural member. More information on this scaffold.

3. Which type of scaffold consists of a braced platform resting on two parallel bearers and hung from overhead supports by ropes of fixed length?

   a. A float, or ship, scaffold
   b. A needle beam scaffold
   c. A bosun's chair
   d. A single-point painter's scaffold

Catenary

A catenary scaffold is a scaffold consisting of a platform supported by two essentially horizontal and parallel ropes attached to structural members of a building or other structure. Catenary scaffolds have a maximum intended load of 500 pounds, and no more than two employees at a time are permitted on the scaffold. [29 CFR 1926 Subpart L Appendix A (r)(2)] More information on this scaffold.
**Interior Hung**

An interior hung suspension scaffold consists of a platform suspended from the ceiling or roof structure by fixed-length supports. The roof structures must be inspected for strength before the scaffold is erected. [More information on this scaffold.](#)

**4. What must be accomplished before erecting an interior hung suspension scaffold?**

- a. Inspect the roof structure
- b. Ensure columns are plumb
- c. Test the ropes to 3X expected load
- d. Make sure the ropes are parallel

**Scissor Lifts**

Scissor lifts are mobile supported scaffold work platforms used to safely move workers vertically and to different locations in a variety of industries including construction, retail, entertainment and manufacturing. Scissor lifts are different from aerial lifts because the lifting mechanism moves the work platform straight up and down using crossed beams functioning in a scissor-like fashion. They do not articulate the work platform from side-to-side. Although scissor lifts present hazards similar to scaffolding when extended and stationary, using scissor lifts safely depends on considering equipment capabilities, limitations and safe practices. [See more information on scissor lifts.](#)

**Aerial Lifts**

An aerial lift is any vehicle-mounted device used to elevate personnel. Aerial lifts have replaced ladders and scaffolding on many job sites due to their mobility and flexibility. They may be made of metal, fiberglass reinforced plastic, or other materials. They may be powered or manually operated and are considered to be aerial lifts whether or not they can rotate around a primarily vertical axis. [See more information on aerial lifts.](#) Types include:

- Extendable boom platforms,
- Aerial ladders,
- Articulating (jointed) boom platforms, and
- Vertical towers.
5. How do scissor lifts differ from aerial lifts?

- a. They are a mechanized
- b. They use criss-crossing supports
- c. They lift workers vertically
- d. They can move horizontally

Criteria for Suspended Scaffolds

General OSHA standard 1910.450 requirements for all types of suspension scaffolds include:

- Employers must ensure that all employees are trained to recognize the hazards associated with the type of scaffold being used. 1926.451(d)(1)
- All support devices must rest on surfaces capable of supporting at least four times the load imposed on them by the scaffold when operating at the rated load of the hoist, or at least one-and-a-half times the load imposed on them by the scaffold at the stall capacity of the hoist, whichever is greater. 1926.451(d)(1)
- A competent person must evaluate all direct connections prior to use to confirm that the supporting surfaces are able to support the imposed load, 1926.451(d)(1)
- All suspension scaffolds must be tied or otherwise secured to prevent them from swaying, as determined by a competent person. 1926.451(d)
- Guardrails, a personal fall arrest system, or both must protect each employee more than 10 feet (3.1 meters) above a lower level from falling. 1926.451(g)
- A competent person must inspect ropes for defects prior to each workshift and after every occurrence that could affect a rope's integrity. 1926.451(d)(10)
- When scaffold platforms are more than 24 inches (61 centimeters) above or below a point of access, ladders, ramps, walkways, or similar surfaces must be used. 1926.451(e)(1)
- When using direct access, the surface must not be more than 24 inches (61 centimeters) above or 14 inches (36 cm) horizontally from the surface. 1926.451(e)(8)
- When lanyards are connected to horizontal lifelines or structural members on single-point or two-point adjustable scaffolds, the scaffold must have additional independent support lines equal in number and strength to the suspension lines and have automatic locking devices. 1926.451(g)(3)(iii)
- Emergency escape and rescue devices must not be used as working platforms, unless designed to function as suspension scaffolds and emergency systems. 1926.451(d)(19)
6. While working on a suspended scaffold, at what height must workers be protected with guardrails, personal fall arrest systems, or both?

   a. Four feet or higher above the ground  
   b. Six feet or higher above a lower level  
   c. Any height over 10 feet above a lower level  
   d. 15 feet or higher

**Fall Protection**

Fall Protection Required for Specific Scaffolds Workers on suspended scaffolds must use a fall protection system to protect them against scaffold failure. This system will usually consist of a full body harness, lanyard, rope grab, independent vertical lifeline and an independent lifeline anchorage. Remember, fall protection is only as good as its anchorage. The anchorage points are independent points on structures where lifelines are securely attached. These points must be able to support at least 5,000 pounds per employee.

<table>
<thead>
<tr>
<th>Type of Scaffold</th>
<th>Fall Protection Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial lifts</td>
<td>Personal fall arrest system</td>
</tr>
<tr>
<td>Needle beam scaffold</td>
<td>Personal fall arrest system</td>
</tr>
<tr>
<td>Boatswains’ chair</td>
<td>Personal fall arrest system</td>
</tr>
<tr>
<td>Catenary scaffold</td>
<td>Personal fall arrest system</td>
</tr>
<tr>
<td>Float (ship) scaffold</td>
<td>Personal fall arrest system</td>
</tr>
<tr>
<td>Single-point and two-point suspension scaffolds</td>
<td>Both a personal fall arrest system <strong>and</strong> a guardrail system</td>
</tr>
</tbody>
</table>
All other suspension scaffolds not specified above | Personal fall arrest system or guardrail systems that meet the required criteria

7. **Anchorage points for suspended scaffolds must be able to support _____.**
   
   - a. four times the actual weight of employees and materials
   - b. 3,000 pounds for fully-loaded scaffold
   - c. three times the expected load of workers, materials, and equipment
   - d. at least 5,000 pounds per employee