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OSHAcademy Course 804 Study Guide

Safe Scaffold Erection and Inspection

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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 804.

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
An estimated 2.3 million construction workers, or 65 percent of the construction industry, work on scaffolds frequently. Protecting these workers from scaffold-related accidents would prevent 4,500 injuries and 50 deaths every year, at a savings for American employers of $90 million in workdays not lost.

Unsafe scaffolding procedures can cause accidents, serious injuries and even death. Accidents involving scaffolding mainly involve:

- workers falling
- incorrect operating procedures
- environmental conditions
- falling materials

This course discusses the general requirements of scaffold safety as well as the components, erection, use and dismantling of supported and suspended scaffolds. It details more specific guidelines for safely erecting, using, and dismantling each type of scaffold. It also describes important guidelines for conducting safety inspections of supported and suspended scaffolds.
Module 1: Basic Guidelines

Guidelines for Scaffold Erection
What is the most visible sign that a scaffold has not been erected properly? The photo to the right will give you a clue. It’s vitally important to make sure that everyone who is involved in the scaffold erection and use is properly trained, and a scaffold erection process has been developed. Let’s take a look at the key best practices associated with scaffold erection and use.

Check out the “World’s most terrifying scaffolding…”

Erectors and dismantlers are workers whose principal activity involves assembling and disassembling scaffolding before other work can begin, and after that work, or a portion of it, has been completed.

Training and Competent Person 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 competent person is defined as one who:

- Is capable of identifying existing and predictable hazards.
- Has authorization to take prompt corrective measures to eliminate such hazards.

Requirements for Designing and Constructing Scaffolds
Scaffolds must be designed by a qualified person and be constructed and loaded in accordance with that design. A qualified person must do adequate preplanning to assure the safe erection and use of the scaffold. Preplanning includes:

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

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. What is the most serious visible sign that a scaffold has not been properly erected?
   a. Extra parts
   b. Collapse
   c. Off plumb
   d. Red tagged

Pre-planning
The first step in the scaffold erection process is effective pre-planning. A qualified person should do adequate pre-planning to make sure a plan has been developed to make sure the scaffold is erected properly.

A successful pre-planning process includes the following steps:

   a. determine the type of scaffold necessary for the job
   b. determine the maximum load of the scaffold
   c. assure a good foundation
   d. avoid electrical hazards

Click here for a sample Scaffold Erection/Dismantling Checklist.

Supervision
Supervise the erection of scaffolding. This should be done by a person competent by skill, experience and training to ensure safe installation according to the manufacturer’s specifications and other requirements.

2. Which of the following steps is unnecessary in the scaffold erection pre-planning process?

   a. Notify OSHA of date and time scaffolding will be erected
   b. Notify the gas company of the date and time scaffolding will be erected
   c. Determine the maximum load of the scaffold
   d. Check the type(s) of soil existing at the excavation site

Footings
Supported scaffold poles, legs, posts, frames, and uprights shall bear on base plates and mud sills or other adequate foundation capable of supporting a loaded scaffold.
Scaffold baseplates and mudsills increase the area where the downward forces of the scaffold are transmitted. The scaffold load is transferred from the uprights to the base plates and then to the mud sills or other adequate foundation from the scaffold legs, which must show minimal or negligible settlement under a full scaffold loading to be adequate.

The purpose of the mud sill under the scaffold base plate is to uniformly distribute the scaffold load over a larger area than that distributed by the base plate alone, thereby reducing the loading on the ground beneath the base plates. Don’t use bricks, blocks, barrels, or other unstable objects to level a scaffold.

**Foundations**

An adequate foundation is one that, like base plates on mud sills, will prevent the scaffold from settling into the ground. In all cases a competent person must inspect and approve the foundation daily.

3. **Support scaffold footings must _____**.

   a. be capable of supporting the loaded scaffold  
   b. easy to assemble  
   c. be made of bricks to level a scaffold  
   d. be at least 5 feet wide by 4 feet long

**Power lines**

Working around high voltage (HV) power lines can be extremely dangerous. As work is being completed, it’s easy to forget the HV lines are overhead. When working around electrical power lines, make sure you know the voltage of energized power lines and ensure everyone is aware of the location of energized power lines.

Maintain, at a minimum, these clearance distances from power lines:

   a. 3 feet for insulated lines less than 300 volts  
   b. 10 feet for insulated lines 300 volts or more

Note: Take the above subject very seriously. Take a look at this short graphic video that demonstrates what happens when a mobile scaffold contacts HV electrical power lines.

4. **How far should scaffolding be from 600-volt insulated power lines?**

   a. At least 3 feet  
   b. Six feet or more  
   c. Up to 8 feet  
   d. At least 10 feet
**Fall Protection**

Be sure fall protection equipment is available before beginning erection and use it as needed. Employers must provide fall protection for each employee on a scaffold more than 10 feet (3.1 meters) above a lower level.

A competent person must determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds.

See the chart on the next page for a summary of the types of fall protection required for specific scaffolds.
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<th>TYPE OF SCAFFOLD</th>
<th>FALL PROTECTION REQUIRED</th>
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<td>Catenary scaffold</td>
<td>Personal fall arrest system</td>
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<tr>
<td>Crawling board (chicken ladder)</td>
<td>Personal fall arrest system, or a guardrail system, or by a 3/4 in (1.9 cm) diameter grabline or equivalent handheld securely fastened beside each crawling board</td>
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<td>Single-point and two-point suspension scaffolds</td>
<td>Both a personal fall arrest system and a guardrail system</td>
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<tr>
<td>Supported scaffold</td>
<td>Personal fall arrest system and a guardrail system</td>
</tr>
<tr>
<td>All other scaffolds not specified above</td>
<td>Personal fall arrest system or guardrail systems that meet the required criteria</td>
</tr>
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</table>
5. At what height above a lower level must employers provide fall protection for each employee on a scaffold?

   a. Above 6 feet  
   b. At least 8 feet  
   c. More than 10 feet  
   d. Four feet or higher  

Heat Sources
Anticipate the presence of hazards associated with heat sources, such as steam pipes, before erecting scaffolds and keep a safe distance from them.

Material Handling
Have scaffolding material delivered as close to the erection site as possible to minimize the need for manual handling. Arrange components in the order of erection.

Storage of Materials
Materials must not be stored on scaffolds or runways in excess of supplies needed for immediate operations.

6. What should you anticipate before erecting scaffolds?

   a. Possible heat sources  
   b. Employee work schedules  
   c. Whether or not OSHA will visit your site  
   d. Which workers are trained  

Condition of Materials
Remove all slippery material from platforms and other scaffold components. Working on a scaffold coated with snow, ice, or other slippery material is prohibited.

Hoisting and Rigging
Ensure hoisting and rigging equipment is available to lift components to the erection point and eliminate the need to climb with components. Examine all scaffold components prior to erection and do the following:

- Return and tag “Do Not Use” or destroy defective components.
- Prohibit or restrict the intermixing of manufactured scaffold components, unless:
  - the components fit together properly, without force
  - the use of dissimilar metals will not reduce strength
✓ the design load capacities are maintained

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.

7. When is working on a scaffold always prohibited?
   a. When OSHA is inspecting the scaffold
   b. When the scaffold is coated with slippery material
   c. When dissimilar metals are used
   d. When crossbracing is used as a toprail

Shore or Lean-to Scaffolds
Shore or lean-to scaffolds are prohibited. They are not properly designed and are a potential safety hazard for anyone who works on them.

Storms and High Winds
Working on a scaffold is prohibited during storms or high winds, unless a competent person has determined that it is safe to be on the scaffold and workers are protected by personal fall-arrest systems or wind screens.

Click here to see what happens to a scaffold in a storm in Denmark.

8. Why is working on shore or lean-to scaffolds prohibited?
   a. OSHA has yet to approve them
   b. They have a history of collapse
   c. They are not approved by an engineer
   d. They are not properly designed

Suspension Ropes
Suspension ropes should be protected from heat and acids or other corrosive substances or be made from material that will not be damaged by corrosive substances.

Tag Lines
When a scaffold might be struck by a swinging load, tag lines or equivalent means should be used to control the load.

Planking
Plank scaffold platforms fully as possible (beginning at the work surface face) with gaps between planks no more than 1 inch wide (to account for plank warp and wane).

See types of planking.
The remaining space on bearer member (between the last plank and guardrail) cannot exceed 9 1/2 inches (the space required to install an additional plank).

View more information in the SAIA Plank and Platform Inspection Guidelines.

9. When should taglines be used when hoisting loads around scaffolds?
   a. When the excavation foundation is unstable
   b. When the scaffold might be struck by the load
   c. When the load must be controlled over workers
   d. When the scaffold might collapse if struck by the load

Platform and Walkway Widths
Platforms and walkways should generally be at least 18 inches wide. If work areas are too narrow for 18-inch platforms or walkways, workers can use narrower platforms, but they should be protected from fall hazards by guardrails and/or personal fall-arrest systems. Some states allow 12-inch widths for ladder jack, top-plate bracket, roof bracket, and pump-jack scaffolds.

Guardrails on Building Side
Guardrail systems are generally not required on the building side when the platform is less than 14 inches from the building, except for suspended scaffolds where the maximum distance is 12 inches. In addition, scaffold setbacks will depend upon the needs of the trade. As an example, masons require the scaffold platform to be as close to the wall as possible (within 6 inches), while lathers and plasterers using spraying apparatus should stand back (and prefer a set-back distance of at least 18 inches).

10. How wide should platforms and walkways generally be?
   a. At least 12 inches
   b. No more than 15 inches
   c. At least 18 inches
   d. Up to 24 inches

Overlap
Platform planks overlapped to create a long platform should overlap at least 12 inches over supports, unless the planks are nailed together or otherwise restrained so they do not move.

Abutted Planks
When platform units are abutted together or overlapped to make a long platform, ensure each end rests on a separate support or equivalent support.
Platform Lengths
A platform 10 feet or less in length should generally extend at least 6 inches, but no more than 12 inches, beyond its support, unless the excess length is guarded or can support workers and material without tipping.

A platform longer than 10 feet should generally extend no more than 18 inches beyond a support unless the excess length is guarded or can support workers and material without tipping.

11. Generally, how far may the planks on a 12-foot long scaffold extend past its support?
   a. About 12 inches
   b. Up to 15 inches
   c. No more than 18 inches
   d. Up to 24 inches

Mixed or Modified Components
Scaffold components made by different manufacturers cannot be mixed unless they fit together easily and do not change the scaffold’s integrity. Components made by different manufacturers cannot be modified to intermix unless a competent person approves.

Components Made from Different Metals
Scaffold components made from different metals cannot be used together unless a competent person approves. If a competent person determines that mixing components made from different metals could reduce their strength, the employer should take corrective action. If a competent person can’t make the determination, then different metals should not be used.

Chemical Treatment
Wood platforms cannot be covered with opaque finishes that might cover defects in wood. Wood platform edges, however, may be marked for identified chemicals. Preservatives or slip-resistant and fire-retardant finishes are acceptable as long as the finish does not cover structural defects or make them hard to spot.

12. When can you mix scaffold components made by different manufacturers?
   a. When other options are not possible to get the scaffolding erected
   b. When components fit together easily and do not change the scaffold’s integrity
   c. When you can make the pieces fit together with slight modification
   d. When manufacturers are able to modify the components prior to sale
Requirements for Access to Scaffolds
Employers should provide all workers with safe access to scaffolds and scaffold platforms. Workers should use ladders or stairways to reach scaffold platforms that are more than 2 feet above or below the access point.

Do not use crossbraces as a means of access. Note that permanent stairways or portable ladders should meet the requirements of Subdivision 3/X (stairways and ladders) of the construction safety and health standards.

When direct access is used, spacing between scaffold and another surface should be no more than 14 inches horizontally and 2 feet vertically. Access can be provided by:

- portable ladders
- hook-on ladders
- attachable ladders
- stairway-type ladders
- integral prefabricated scaffold rungs
- direct passage from another scaffold
- structure or personnel hoist
- ramps
- runways
- similar adequate means

13. At what height should workers use ladders or stairways to reach scaffold platforms?

   a. More than 2 feet above or below the access point
   b. More than 3 feet above the access point
   c. More than 3 feet below the access point
   d. More than 4 feet above or below the access point

Ladders and Rest Platforms
Many accidents happen because employees to not access platforms safely. Crossbraces and scaffold frames should not be used to access scaffold platforms unless they are equipped with a built-in ladder specifically designed for that purpose.
All ladders in use should meet OSHA specifications, designed according to standards and secured against displacement.

The bottom steps of ladders should not be more than 2 feet from the supporting level.

Hook-on and attachable ladders on supported scaffolds more than 35 feet high should have rest platforms at 35-foot intervals.

Stairway-type ladders should have rest platforms every 12 feet.

Integral prefabricated scaffold-access frames should have rest platforms every 35 feet.

Additional recommendations for the erection of supported scaffolds, suspension scaffolds, fabricated frame scaffolds, outrigger scaffolds, etc., are also described in this course.

14. Crossbraces and scaffold frames should not be used to access scaffold platforms unless

   a. they are equipped with a built-in ladder
   b. they are approved by the safety supervisor
   c. ladders are securely attached with clamps
   d. the scaffold is higher than 10 feet
Module 2: Inspecting Fabricated Frame Supported Scaffolds

Introduction
Supported scaffolds consist of one or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support. Because frame scaffolds are the most common type of supported scaffold, this course uses the Fabricated Frame Scaffold to describe requirements that are common to all supported scaffolds. Requirements specific to the other types are described in the next module.

Self-Supporting Scaffolds
A self-supporting scaffold is one or more work platforms supported from below by outriggers, brackets, poles, legs, uprights, posts, frames or similar rigid supports.

1. What is the most common type of supported scaffold?
   a. Pole scaffolds
   b. Frame supported scaffold
   c. Shore or Lean-to scaffolds
   d. Tube and Coupler scaffolds

Inspecting Fabricated Frame Scaffolds
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.

Note: Except where indicated, the same basic scaffold requirements that appear in this module also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in this course.

Base Section
It is impossible for a stable structure to be built upon a foundation that does not start out square and level. OSHA has standards that apply specifically to the steps that must be taken to assure a stable scaffold base.

Real-Life Example
Scaffold Collapses and Worker Injured
An employee was on a scaffold that was being dismantled when the scaffold collapsed. He fell, sustaining a concussion for which he was hospitalized. The scaffold was not secured to wooden footing supports, nor was it tied to the building.
2. It is impossible for a stable scaffold structure to be built unless _____.
   a. the base is wider than the top level
   b. it contains vibration sensors
   c. the foundation is square and level
   d. it is attached to the building

Foundations
It is absolutely essential to understand that scaffolds are never as safe as the foundations they are built on.

1. In order to assure stability, make sure supported scaffold foundations are set on:
   a. base plates
   b. mud sills
   c. other adequate firm foundations

2. Ensure footings are capable of supporting the loaded scaffold without settling or displacement.

3. Make sure unstable objects are not used to support scaffolds or platform units.

4. Check that front-end loaders and similar pieces of equipment are not used as support scaffold platforms, unless they have been specifically designed by the manufacturer for such use.

5. Ensure forklifts are not used to support scaffold platforms, unless:
   a. The entire platform is attached to the fork.
   b. The forklift is not moved horizontally while the platform is occupied.

Note: One way to ensure a stable foundation when a sill is used is to secure it to the baseplate.

Foundation Examples
Compacted Soils & Then Frozen - Compacted soils, as with all soils, swell and heave due to moisture content or water contained within the soil. This creates a dangerous situation during the freeze/thaw cycle (which can occur in the course of a day) causing the soil to swell or settle and may not result in a level rigid footing. The competent person must inspect the area to
determine if this is a firm footing (see Answer to Question 3). Then this must be inspected when conditions change, such as sunny conditions, warming temperatures, etc.

Cold asphalt paving (winter) - Asphalt has minimal compressive strength, even when cold, and especially when applied. By itself it is not normally a useable foundation material.

Hot asphalt paving (summer) - This type of asphalt (topcoat) is soft when placed and then compacted with rollers. It is generally applied as a thin coat over a base coat and takes several days to achieve its designed strength. Only the base coat gives the asphalt compressive strength.1

Wood decking - This may lend itself for use as a foundation. However, an evaluation of the deck for its maximum allowable loading would be required, since the decking or deck structure could fail under a full scaffold load. The competent person would need to know the individual scaffold base plate loading and if each one is below the maximum allowable deck loading. A light weight supported scaffold could be used on wood decking when the competent person has determined the structure would support the scaffold and its entire load.

Compacted Gravel Roads - This type of road surface may have adequate strength, but the material does not provide a smooth surface. Additionally, there is no material cohesion; during a storm the material can wash away under the scaffold base plates.

3. What are supported scaffold foundations set on to ensure stability?

   a. Wet sand
   b. Loose, deep gravel
   c. Mud slopes
   d. Base plates

Scaffold Plumb
Supported scaffold poles, frames, uprights, etc. must be plumb and braced to prevent swaying and displacement. In general, a level is the easiest way to achieve the desired right angles.

Inspecting the Support Structure
To control the risk of a scaffold falling or collapsing, employers must assure that scaffolds are built within OSHA standards relating to strength and structural integrity.

Note: Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds described in their applicable sections.

Capacity
It’s critical to check to make sure scaffolds do not exceed their rated capacity.
1. Check that scaffolds and scaffold components are capable of supporting, without failure, their own weight and at least 4 times their maximum intended load.

2. Ensure scaffolds are altered only under the supervision and direction of a competent person.

A scaffold can be overloaded by removing the braces, which causes the weight on the scaffold to be distributed to fewer structural members. Even if they are "in the way," braces should not be removed while work is being performed on a scaffold!

### 4. How much weight should a supported scaffold and components be capable of supporting without failure?

- a. The scaffold's own weight
- b. The scaffold's own weight and at least 2 times its maximum intended load
- c. The scaffold's own weight and at least 4 times its maximum intended load
- d. At least 3 times its maximum intended load

**Bracing**

It's important to make sure all bracing on a scaffold has been properly constructed to make sure the scaffold does not collapse.

1. Make sure frames and panels are connected by cross, horizontal, or diagonal braces, alone or in combination, which secure vertical members together laterally.

2. Check to make sure frames are stacked, and that cross braces are of such length as will automatically keep the scaffold plumb, level, and square.

3. Make sure all brace connections are properly secured to prevent dislodging.

Note: A level should be used during assembly to make sure new structural components remain in line.

**Pinning**

Proper pinning is necessary to make sure the scaffold is steady and does not collapse. Separation of frames can occur in high winds (uplift), or when workers climb endframes, overload the platform, or strike the scaffold with tools, materials, etc.

1. Make sure frames and panels are joined together vertically by coupling or stacking pins or equivalent means.

2. Ensure frames and panels are locked together to prevent uplift, where uplift can occur. Uplift is the separation of a frame from the frame below it.
5. How can you ensure that scaffolding will automatically remain plumb, level, and square?

   a. Alternate the length of diagonal braces  
   b. Make sure lower braces are longer than upper braces  
   c. Install cross braces that are the appropriate length  
   d. Connect frames with vertical braces

Components

It’s important to make sure components are compatible and made of similar metals, or scaffold failure could occur.

1. Make sure scaffold components manufactured by different manufacturers are not intermixed, unless they fit together without being forced and the scaffold's structural integrity is maintained.

2. Ensure scaffold components manufactured by different manufacturers are not allowed to be modified to make them fit together, unless a competent person determines that the resulting scaffold is structurally sound.

3. Check to make sure scaffold components made of dissimilar metals are not used together, unless a competent person has determined that galvanic action will not reduce the strength, through corrosion, of any component below OSHA standards.

6. Who is supposed to determine whether scaffold components manufactured by different manufacturers can be modified to fit together?

   a. Experienced worker  
   b. A competent person  
   c. A certified safety professional  
   d. On-site safety manager

Inspecting for Adequate Access

Workers are most vulnerable to fall hazards when climbing on or off a scaffold. Therefore, employers are required to provide safe scaffold access.

Erectors and dismantlers face additional access problems due to the incomplete condition of the scaffolding. Requirements to prevent falls that apply only to these workers are addressed separately below.

The competent person is responsible for determining the safety and feasibility of installing and using safe means of access, based on site conditions and the type of scaffold involved.
1. Be sure employees are able to safely access any level of a scaffold that is 2 feet above or below an access point.

2. Make sure employees do not use cross-braces as a means of access.

**Scenario**

**Improper Access Leads to Serious Injuries**

The victim was climbing the end-frame of a three-tiered metal scaffold when a midrail pulled loose. He fell approximately 12 feet to a concrete dock. He suffered multiple fractures to the head, left and right foot, and left wrist, and torn ligaments in the knees.

<table>
<thead>
<tr>
<th>7. When are workers on scaffolding most vulnerable to fall hazards?</th>
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<tbody>
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<td>a. When training new workers</td>
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<td>b. When planning the construction of the scaffold</td>
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<td>c. When working and properly connected to a fall harness</td>
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<td>d. When climbing on or off a scaffold</td>
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**Ladders**

The most frequent fall-from-elevation accident is a fall off ladders. They must be in good worker order or taken out of service.

1. Make sure portable, hook-on, and attachable ladders are positioned so as not to tip the scaffold.

2. Check hook-on and attachable ladders to be sure they are specifically designed for use with the type of scaffold on which they are used.

3. Make sure hook-on and attachable ladder rungs:

   a. are positioned so that their bottom rung is not more than 24 inches above the scaffold supporting level

   b. have uniform spacing between rungs of a maximum 16¾ inches

   c. have minimum rung length of 11½ inches

   d. have rest platforms provided at a maximum of 35-foot vertical intervals

4. Ensure stairway-type ladders:
a. are positioned so that their bottom step is not more than 24 inches above the scaffold supporting level

b. have rest platforms at maximum vertical intervals of 12 feet

c. have a minimum step width of 16 inches, except for mobile scaffold stairway-type ladders, which must have a minimum step width of 11½ inches

d. have slip-resistant treads on all steps and landings

5. Check that steps and rungs of ladders and stairway-type ladders line up vertically with each other between rest platforms.

8. What do you need to do with a ladder that is defective?

   a. Tag it and take it out of service
   b. Put it on a review list for evaluation and possible removal
   c. Use it "carefully" until the company can afford a new ladder
   d. Nothing, just ignore it because it's likely no one will be hurt

Integral (Built-in Access)

1. Make sure integral (built-in) scaffold access frames:

   a. are specifically designed and constructed for use as ladder rungs

   b. are not used as work platforms when rungs are less than 11½ inches in length, unless each affected employee uses appropriate fall protection

   c. have rungs which are uniformly spaced and a length of at least 8 inches, with a maximum space between rungs of 16¾ inches

   d. have rest platforms provided at a maximum of 35-foot vertical intervals

2. Stair towers have many specific design requirements. Make sure stair towers have:

   a. a stair rail consisting of a toprail and a midrail on each side of the stairway

   b. a toprail of each stair rail system capable of serving as a handrail, unless a separate handrail is provided

   c. sufficient handhold on handrails, and toprails serving as handrails, for employees grasping them to avoid falling
d. stair rails and handrails surfaced to prevent punctures or lacerations to employees, and to prevent snagging of clothing

e. stair rails and handrails constructed so that they do not constitute a projection hazard

f. a space of at least 3 inches between handrails, or stair rails used as handrails, and other objects

g. a distance of no less than 28 inches and no more than 37 inches from the upper surface of the stair rail to the forward edge of the tread, in line with the face of the riser

h. a landing platform at least 18 inches wide by 18 inches long at each level

i. a scaffold stairway width of at least 18 inches between stair rails

j. slip-resistant surfaces on treads and landings

k. stairways installed between 40 degrees and 60 degrees from the horizontal

l. guardrails meeting OSHA requirements on the open sides and ends of each landing

m. uniform riser height, within ¼-inch, for each flight of stairs

n. greater variations in riser height are allowed for the top and bottom steps of the entire system (not for each flight of stairs)

o. uniform tread depth, within ¼-inch, for each flight of stairs

9. What are integral (built-in) access frames specifically designed for?

   a. Dismantling scaffolding
   b. Temporary scaffolding
   c. Single-level scaffolding
   d. Use as ladder rungs

Ramps and Walkways

1. Ensure ramps and walkways 6 feet or more above lower levels have guardrails that comply with 1926 Subpart M - Fall Protection.
2. Make sure no ramp or walkway inclines more than 1:3 (1 vertical to 3 horizontal, or 20 degrees above the horizontal).

3. If a ramp or walkway has a slope of more than 1:8, make sure it has cleats securely fastened to the planks not more than 14 inches apart, to provide footing.

Direct Access
Check that direct access to or from another surface is permitted only when the scaffold is not more than 14 inches horizontally and not more than 24 inches vertically from the other surface.

Erectors and Dismantlers
1. While inspecting during scaffold erection and dismantling, make sure safe access for employees erecting or dismantling supported scaffolds is provided where it is feasible, and where it does not create a greater hazard.

2. Ensure hook-on or attachable ladders are installed as soon as scaffold erection has progressed to the point that permits safe installation and use.

3. If end frames are used as climbing devices for access OR if you are erecting and dismantling tubular and welded-frame scaffolds, make sure:
   a. Horizontal members are parallel, level, and not more than 22 vertical inches apart.
   
   b. Horizontal members are erected in a manner that creates a usable ladder and provides good hand hold and foot space.

4. Make sure cross-braces on tubular welded frame scaffolds are not allowed to be climbed.

10. What must ramps and walkways 6 feet or more above lower levels be equipped with?
   a. Vertical walls
   b. Fall harnesses
   c. Guardrails
   d. Hatchways

Inspecting for Fall Protection
The number one scaffold hazard is worker falls. Fall protection consists of either personal fall-arrest systems or guardrail systems and must be provided on any scaffold 10 feet or more above a lower level. Specific requirements are described below.
Note: Except where indicated, these requirements also apply to manually propelled, pump jack, ladder jack, tube and coupler, and pole scaffolds, as well as the specialty scaffolds.

1. Make sure each employee on a scaffold more than 10 feet above a lower level is protected from falling to that lower level.

2. Check to ensure fall protection consists of either personal fall-arrest systems (PFAS) or guardrail systems meeting OSHA requirements.

3. Ensure that employees performing overhand bricklaying operations from a supported scaffold are protected from falling from all open sides and ends of the scaffold, except at the side next to the wall being laid.

**Fall-Arrest Systems**

Personal fall-arrest systems used on scaffolds should be attached by lanyard to a vertical lifeline, horizontal lifeline, or scaffold structural member.

1. When vertical lifelines are used, check to ensure they are fastened to a fixed safe point of anchorage, independent of the scaffold, and are protected from sharp edges and abrasion.

2. Check to ensure safe points of anchorage, such as structural members of buildings, are being used.

3. Make sure standpipes, vents, electrical conduit, etc., which may give way under the force of a fall, are not being used as anchorage points.

4. Make sure two or more vertical lifelines are not attached to each other, or to the same point of anchorage.

5. When horizontal lifelines are used, make sure they are being secured to two or more structural members of the scaffold.

**Real-Life Example**

*Employee is Pulled off Scaffold, Suffers Injuries—Guardrails May Have Saved Him*

While sitting or kneeling on a fixed deck plank attached to a fabricated frame scaffold, a worker was pulling a 16-foot long 2x4 off the bucket of an excavator. There were no guardrails at the working level. When the other end of the 2x4 slipped off the bucket, the employee did not let go of his end, and was pulled off the deck. He fell 16 feet to the ground, sustaining facial fractures and other injuries.
11. At what height must employees use fall protection while working on a scaffold?

a. Four or more feet above ground level
b. Six feet while working above dangerous equipment
c. Ten feet or more above a lower level
d. More than 15 feet above a lower level

Guardrail Systems

Guardrail systems — or guardrails — are barriers erected along an unprotected or exposed side or edge of a walking-working surface to prevent falls. The standard requires employers to protect each employee on a scaffold more than 10 feet (3.1 m) above a lower level from falling to that lower level. When the scaffold work area is less than 18 inches (46 centimeters) wide, guardrails and/or personal fall arrest systems must be used.

- **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).

- **Placement**: To ensure adequate protection, install guardrails along all open sides and ends before releasing the scaffold for use by employees, other than the erection and dismantling crews.

- **Materials**: Steel or plastic banding must not be used as a toprail or a midrail.

- **Strength**:
  - Guardrail systems must be capable of withstanding, without failure, a force of at least 200 pounds applied in a downward or outward direction at any point within two inches of the top edge of the top rail. The guardrail system must not deflect to a height less than 39 inches.
  - Manila or synthetic rope used for top rails must be inspected to ensure that the rope meets the strength requirement.
  - Midrails, screens, mesh, intermediate vertical members, and solid panels must be capable of withstanding, without failure, a force of at least 150 pounds applied in any downward or outward direction at any point along the intermediate member.
  - Manila or synthetic rope used for midrails must be inspected to ensure that the rope meets the strength requirement.
• **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.

• **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.

• **Screens and mesh:** When used, must extend from the walking-working surface to the toprail and along the entire opening between toprail supports.

• **Intermediate vertical members:** Must be installed no more than 19 inches apart.

• **Surfaces:** Guardrail systems must have smooth surfaces.

• **Ends of top rails and midrails:** Must not pose a projection hazard.

• **Steel or plastic banding:** Must not be used for top rails or midrails. Chain or cables can be used when they satisfy all of the guardrail requirements.

• **Top rail and midrail dimensions:** Must be at least 0.25 inches in diameter or 0.25 inches thick.

• **Guardrail systems used at hoist areas:** A removable guardrail section, consisting of a top rail and midrail, must be placed across the access opening between guardrail sections when the hoist is not being used. Chains or gates are acceptable if they offer equivalent protection.

• **Use of Stilts:** Stilts may be used by employees 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.

• **Exceptions:** Guardrails are not required when:
  
  o the front end of all platforms are less than 14 inches (36 centimeters) from the face of the work;

  o outrigger scaffolds are 3 inches (8 centimeters) or less from the front edge; or

  o employees are plastering and lathing 18 inches (46 centimeters) or less from the front edge.)
12. Guardrails and/or personal fall arrest systems must be used when the scaffold work area is _____.

   a. less than 18 inches wide
   b. more than 18 inches wide
   c. less than 12 inches wide
   d. more than 12 inches wide

Inspecting the Platform
Except when used only as a walkway, the platform is the work area of the scaffold. Therefore, an inspection of a scaffold platform requires safety checks of both the platform structure and how the platform is used by the workers.

Planking

1. Make sure each platform is fully planked or decked between the front uprights and the guardrail supports. Note: Platforms used solely as walkways, or during erection or dismantling, require only the planking that the employer establishes is necessary to provide safe working conditions.

2. Make sure no gaps greater than 1 inch are permitted between adjacent planks or deck units, or between the platform and the uprights.

3. If it can be demonstrated that a wider space is necessary, check to make sure the gap is as small as possible and does not exceed 9½ inches.

4. Make sure wooden planking is covered with opaque finishes, except that platform edges may be marked for identification. Note: Platforms may be coated periodically with wood preservatives, fire retardants, and slip-resistant finishes, provided they do not obscure the top or bottom wood surfaces.

5. Ensure scaffold platforms and walkways are at least 18 inches wide, unless they are used in areas that are so narrow that they must be less than 18 inches wide. In such cases, verify that the platforms are as wide as feasible, and fall protection is provided.

6. Make sure that anything that could cause a slip, trip or fall (i.e. tools, scrap material, chemicals, snow, ice, etc.) has not been allowed to accumulate on the platform. Note: For the same reason, cleats or other means of connecting planks should be on the underside.

7. Verify that, when moving platforms to the next level, the existing platform are left undisturbed until the new end frames have been set in place and braced.
13. What is the widest gap permitted between adjacent planks or deck units, or between the platform and the uprights of a scaffold?

   a. No gaps permitted
   b. No more than 1 inch
   c. No more than 2 inches
   d. No more than 3 inches
Module 3: Inspecting Other Supported Scaffolds

Inspecting Tube and Coupler Scaffolds
A tube and coupler scaffold is a supported scaffold consisting of platforms supported by individual pieces of tubing, erected with coupling devices connecting uprights, braces, bearers and runners.

Tube and coupler scaffolds more than 125 feet high must be designed by a registered professional engineer and constructed and loaded consistent with the design.

Bracing
Braces are rigid connections that hold one scaffold member in a fixed position with respect to another member, or to a building or structure.

- Check that transverse bracing forming an "X" across the width of the scaffold is installed at the scaffold ends and at least at every third set of posts horizontally (measured from only one end) and every fourth runner vertically.

- Ensure bracing extends diagonally from the inner or outer posts or runners upward to the next outer or inner posts or runners.

- Check that building ties are installed at the bearer levels between the transverse bracing and conform to the requirements of 1926.451(c)(1).

- Make sure bracing is placed for each section of six levels between the fourth and sixth levels.

- Ensure bracing extends diagonally from the inner or outer posts or runners at the bottom of the fourth level, upward to the inner or outer posts or runners at the bottom of the fifth level, and likewise to the sixth level.

- If this technique is used, check that the scaffold is tied at the "k" function level.

- Check that on straight run scaffolds, longitudinal/diagonal bracing across the inner and outer rows of posts is installed diagonally in both directions and extends from the base of the end posts upward to the top of the scaffold at approximately a 45-degree angle.

- When the length of the scaffold is greater than the height, bracing should be repeated starting at least with every fifth post.

- When the length is shorter than the height, bracing should be installed from the base of end posts upward to the opposite end posts and then in alternating directions until the top of the scaffold is reached.
In situations where the attachment of bracing to posts is precluded, the bracing should be attached to the runners.

1. At what height must tube and coupler scaffolds be designed by a registered professional engineer?
   
a. More than 75 feet high  
b. Between 100 and 150 feet high  
c. More than 125 feet high  
d. All heights above 100 feet

**Bearers**

Bearers (putlogs) are horizontal transverse scaffold members (which may be supported by ledgers or runners) upon which the scaffold platform rests and which joins scaffold uprights, posts, poles, and similar members.

Bearers should be installed transversely between the posts, and when coupled to the posts, the inboard coupler should bear directly on the runner coupler.

When the bearers are coupled to the runners, the couplers should be as close to the posts as possible.

Bearers should extend beyond the posts and runners and provide full contact with the coupler.

When platforms are being moved to the next level, verify that the existing platform is left undisturbed until new bearers have been set in place and braced prior to receiving the new platforms.

**Runners**

Runners (ledgers or ribbons) are the lengthwise horizontal spacing or bracing members which may support the bearers.

- The scaffold should have runners installed along its entire length and along both the inside and outside posts at the various level heights.
- Runners should be interlocked on straight runs to create continuous lengths and be coupled to each post.
- Bottom runners should be located as close to the base as possible. Couplers should be made of structural metal.

**Scenario**

**Improper Coupling Results in Two Deaths**
A tubular, welded-frame scaffold, 31 feet high, was erected to paint a 33-foot high sign at the entrance of a new shopping mall. After the sign had been partially painted, the scaffold was moved to allow concrete to be placed around the sign. Several days later, a crew of seven workers was instructed to replace the scaffold and finish painting the sign. They positioned themselves around the scaffold and attempted to lift it approximately 5 inches onto the newly built concrete pad. As they were lifting the scaffold, the top section partially separated from the adjoining section, toppled over, and contacted a power line. A 28-year old carpenter and a 31-year old laborer were electrocuted. The other five workers were hospitalized with electrical burns.

2. The lengthwise horizontal spacing or bracing members of a tube and coupler scaffold are called _____.
   a. bearers
   b. runners
   c. sills
   d. bracing

Mobile Scaffolds
A mobile scaffold is a powered or non-powered, portable, caster or wheel-mounted supported scaffold. Mobile scaffolds constructed of tube and coupler components or of fabricated frames should conform to design, construction and loading requirements for those scaffolds.

1. Ensure scaffolds are braced by cross, horizontal or diagonal braces, or combination thereof, to prevent racking or collapse, and that vertical members are secured together laterally so that vertical members are squared and aligned.

2. Make sure scaffolds should be plumb, level and squared and that all brace connections are secured.

3. Ensure platforms do not extend past the base supports unless outrigger frames or equivalent devices are used to ensure stability.

4. Check to see that platforms do not extend past the base supports unless outrigger frames are used.

5. Make sure caster and wheel stems are pinned or otherwise secured in scaffold legs.

6. Make sure that, while in a stationary position, casters and wheels are locked with a positive wheel and/or wheel and swivel locks, or equivalent means, to prevent
movement. Note: A rolling scaffold load capacity is limited by the weight its casters can support.

7. Check that employees are not allowed to ride on a mobile scaffold unless strict controls are followed (level and unobstructed surfaces, a height ratio to width of not more than two to one, slow speed of movement, confinement of employees within the scaffold frame, etc.)

8. When manual force is used to move the scaffold, make sure the force is applied as close to the base as practicable, but no more than 5 feet above the supporting surface (i.e., scaffold base or wheels when a powered system is used).

9. Make sure powered systems used to propel mobile scaffolds are designed for such use.

10. Ensure forklifts, trucks, similar motor vehicles or add-on motors are not used to propel scaffolds unless the scaffold is designed for such propulsion systems.

Watch this short video about mobile scaffold erection.

3. Check to verify platforms on mobile scaffolds do not extend past the base supports

   a. except when they are tied to the frame
   b. more than six inches on ends
   c. at any time after installation
   d. unless outrigger frames are used

Pole Scaffolds

Single Pole Scaffold. A single pole scaffold is a supported scaffold consisting of platforms resting on bearers, the outside ends of which are supported on runners (ledgers or ribbons) secured to a single row of posts or uprights, and the inner ends of which are supported on or in a structure or building wall.

Double Pole Scaffold. A double pole (independent pole) scaffold is a supported scaffold consisting of platforms resting on cross beams supported by ledgers and a double row of uprights independent of support (except for ties, guys and braces) from any structure.

Specific Requirements

Double Pole Scaffold

- When platforms are moved to the next level, the existing platform must be left undisturbed until the new bearers have been set in place and braced.
Where wooden poles are spliced, the following regulations apply:

- The ends must be squared.
- The upper section must rest squarely on the lower section.
- Wood splice plates or scab plates must be provided on at least two adjacent sides, and must:
  - Extend at least 2 feet on either side of the splice.
  - Overlap the abutted ends equally.
  - Have at least the same cross-sectional areas as the pole.
  - Splice plates made of materials other than wood may be used, as long as they are of equivalent strength.

Pole scaffolds over 60 feet in height must:

- Be designed by a registered professional engineer.
- Be constructed and loaded in accordance with that design.

4. Which of the following is TRUE regarding pole scaffolds?

   a. They must be built from scratch
   b. They are easy to reuse
   c. They are commonly used today
   d. They are made entirely of metal

Pole scaffolds more than 60 feet in height must be designed by a registered professional engineer and constructed and loaded in accordance with that design.

Inspecting Braces, Bearers, and Runners

- Crossbracing must be installed between the inner and outer sets of poles on double pole scaffolds.
- Diagonal bracing must be installed in both directions across:
  - The entire outside face of double- and single-pole scaffolds.
  - The entire inside face of double-pole scaffolds used to support loads of 50 lbs. or more per square foot.
Runners and bearers must be installed on edge.

Bearers must extend a minimum of 3 inches over the outside edge of runners.

Runners must:
- Extend over two poles at minimum.
- Be supported by bearing blocks securely attached to the poles.

Braces, bearers, and runners must not be spliced between poles.

5. At what height must pole scaffolds be designed by a registered professional engineer?
   a. Any height above 10 feet for single-pole scaffolds
   b. Any height over 30 feet for double-pole scaffolds
   c. More than 60 feet in height
   d. More than 125 feet in height

Bricklayer’s Square
A bricklayer’s square scaffold is a supported scaffold composed of framed squares that support a platform.

1. Ensure these types scaffolds do not exceed three tiers in height and are constructed and arranged so that one square rests directly above the other.

2. Make sure scaffolds made of wood are reinforced with gussets on both sides of each corner.

3. Check that diagonal braces are installed between squares on the rear and front sides of the scaffold and that they extend from the bottom of each square to the top of the next square.

4. Make sure the upper tiers of the scaffold stand on a continuous row of planks laid across the next lower tier and nailed down or otherwise secured to prevent displacement.

6. What is the maximum number of tiers a bricklayer’s scaffold can have?
   a. Two
   b. Three
   c. Four
   d. Five
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 move the work platform straight up and down using crossed beams functioning in a scissor-like fashion.

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.

When inspecting scissor lifts, check the following to make sure the scissor lift:

- components are in proper working condition and not defective in any way;
- brakes, once set, hold the scissor lift in position;
- guardrails are installed before working on the lift to prevent workers from falling;
- never moves in an elevated position;
- is positioned so that work is within easy reach to avoid leaning away from the scissor lift;
- is stable and will not tip over or collapse;
- is positioned on firm, level surfaces away from hazards that can cause instability;
- is isolated from other equipment that could contact it; and
- is used outside only when weather conditions are good with wind speeds below 28 miles per hour.

The following work practices ensure that scissor lifts are used safely. Workers must:

- only stand on the work platform; never stand on the guardrails;
- never load the work platform beyond manufacturer's load rating;
- only use the scissor lift mechanism to raise the work platform;
- prevent the scissor lift from being struck by other equipment;
- never move the scissor lift within 10 feet of energized or other overhead objects;
- receive training on scissor lift safe use, identifying hazards, and reporting defects;
- receive electrical training to be qualified to work near electrical sources; and
- use appropriate traffic control measures to prevent collision.
7. Which of the following is TRUE regarding scissor lift scaffolds?

a. They must not extend higher than 20 feet  
b. The brakes must not be set when the scaffold lowered  
c. They must never be moved in an elevated position  
d. They may be used outside in winds up to 45 mph

Aerial Lifts

An aerial lift is any vehicle-mounted device used to elevate personnel. Types include:

- Extendable boom platforms,
- Aerial ladders,
- Articulating (jointed) boom platforms,
- Vertical towers, and
- Any combination of the above.

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.

Many workers are injured or killed on aerial lifts each year. OSHA provides the following information to help employers and workers recognize and avoid safety hazards they may encounter when they use aerial lifts.

Inspecting the Lift

When inspecting aerial lifts, check the following pre-start, vehicle, lift, and guardrail system items:

Pre-start Inspection

Prior to each work shift, conduct a pre-start inspection to verify that the equipment and all its components are in safe operating condition. Follow the manufacturer’s recommendations and include a check of:

Vehicle components

- proper fluid levels (oil, hydraulic, fuel and coolant);
- leaks of fluids;
- wheels and tires;
- battery and charger;
• lower-level controls;
• horn, gauges, lights and backup alarms; and
• steering and brakes.

Lift components
• operating and emergency controls;
• personal protective devices;
• hydraulic, air, pneumatic, fuel and electrical systems;
• fiberglass and other insulating components;
• missing or unreadable placards, warnings, or operational, instructional and control markings;
• mechanical fasteners and locking pins;
• cable and wiring harnesses;
• outriggers, stabilizers and other structures; and
• loose or missing parts;

Guardrail systems
• Do not operate any aerial lift if any of these components are defective until it is repaired by a qualified person.
• Remove defective aerial lifts from service (tag out) until repairs are made.

Work Area Inspections
Employers must assure that work areas are inspected for hazards and take corrective actions to eliminate such hazards before and during operation of an aerial lift. Items to look for include:
• drop-offs, holes, or unstable surfaces such as loose dirt;
• inadequate ceiling heights;
• slopes, ditches, or bumps;
• debris and floor obstructions;
• overhead electric power lines and communication cables;
• other overhead obstructions;
• other hazardous locations and atmospheres;
• high wind and other severe weather conditions, such as ice; and
- the presence of others in close proximity to the work.

**Training**

Only trained and authorized persons are allowed to operate an aerial lift. The following training is required to ensure that aerial lifts are safely used:

- Explanations of electrical, fall, struck-by and falling object hazards;
- Procedures for dealing with hazards;
- Recognizing and avoiding unsafe conditions in the work setting;
- Instructions for correct operation of the lift (including maximum intended load and load capacity);
- Demonstrations of the skills and knowledge needed to operate an aerial lift before operating it on the job;
- When and how to perform inspections; and
- Manufacturer’s requirements.

Workers should be retrained if any of the following conditions occur:

- An incident occurs during aerial lift use,
- Workplace hazards involving an aerial lift are discovered, or
- A different type of aerial lift is used.
- Employers should also retrain workers who they observe operating an aerial lift improperly.

8. Which vehicle-mounted device has replaced ladders and scaffolding on many job sites due to their mobility and flexibility?

   a. Pneumatic lift
   b. Hydraulic lift
   c. Aerial lift
   d. Scissor lift
Module 4: Special Use Supported Scaffolds

Special use scaffolds should be capable of supporting their own weight and at least four times the maximum intended load applied or transmitted to the scaffold and components.

Form and Carpenter Bracket Scaffolds

Form scaffold: A form scaffold is a supported scaffold consisting of a platform supported by brackets attached to a formwork.

Carpenter’s Bracket Scaffold: A carpenter’s bracket scaffold is a supported scaffold consisting of a platform supported by brackets attached to building or structural walls.

1. Make sure each bracket, except those for wooden bracket-form scaffolds, is attached to the supporting framework or structure by one or more of the following:
   a. nails
   b. metal stud attachment device
   c. welding
   d. hooking over a secured structural supporting member, with the form walls either:
      o bolted to the form
      o secured by snap ties or tie bolts extending through the form
      o securely anchored
   e. (for carpenters’ bracket scaffolds only) by a bolt extending through to the opposite side of the structure's wall

2. Ensure wooden bracket-form scaffolds are an integral part of the form panel.

3. Ensure folding-type metal brackets, when extended for use, are either bolted, or secured with a locking-type pin.

1. In addition to its own weight, how much weight should a special use scaffold be able to support?

   a. Over two times the maximum potential load
   b. Up to three times the measured load
   c. At least four times the maximum intended load
   d. Over five times the anticipated load

Roof Bracket Scaffolds

A roof bracket scaffold is a rooftop supported scaffold consisting of a platform supported by triangular shaped supports.

1. Ensure brackets conform to the pitch of the roof and produce a level support for the platform.
2. Check that brackets are secured in place by nails.

3. When nails are not practical, make sure brackets are anchored by 3/4-inch first grade manila rope or its equivalent.

2. **When practical what should brackets be secured in place with?**
   
   a. Nails
   b. Belts
   c. Hooks
   d. Tape

**Outrigger Scaffolds**

An outrigger scaffold is a supported scaffold consisting of a platform supported by outrigger beams (thrustouts) projecting beyond the wall or face of a building or structure with the inboard ends secured inside the building or structure.

When inspecting Outrigger Scaffolds, check the following:

1. Make sure outrigger beams are:
   
   a. secured in place to prevent movement
   
   b. securely braced at the fulcrum point to prevent tipping

2. Make sure the inboard end of outrigger beams are:
   
   a. not less than 1½ times the length of the outboard end, measured from the fulcrum point to the extreme anchorage point

   b. securely anchored either by:
      
      • braced struts bearing against sills in contact with the overhead beams or ceiling
      
      • tension members secured to the floor joists underfoot
      
      • both braced struts or tension members

3. Check that the fulcrum point of outrigger beams rest on secure bearings at least 6 inches in each horizontal dimension.

4. If outrigger beams are fabricated in the shape of an I-beam or channel beam, make sure they are placed so that the web section is vertical.
5. Make sure the entire supporting structure is securely braced to prevent any horizontal movement.

6. To prevent their displacement, make sure platform units are:
   a. nailed
   b. bolted
   c. otherwise secured to outriggers

7. Verify scaffolds and scaffold components are:
   a. designed by a registered professional engineer
   b. constructed and loaded in accordance with that design

3. When inspecting outrigger scaffolds the outrigger beams should be _____.
   a. securely braced by two workers standing on the end of each beam
   b. securely braced at the fulcrum point to prevent tipping
   c. secured to an anchor point that is rated under 2000 lbs
   d. secured to an anchor point that is rated under 1000 lbs

Inspecting Pump Jack Scaffolds
A pump jack scaffold is a supported scaffold consisting of a platform supported by vertical poles and movable support brackets. When inspecting these scaffolds, check the following:

1. Make sure brackets, braces and accessories for pump jack scaffolds are fabricated from metal plates and angles.

2. Check that two positive gripping devices are being used for each bracket.

3. Ensure poles are secured to structures by rigid triangular bracing or its equivalent at the bottom, top, and other points.

4. Verify that when the platform is raised, crossbracing is added about 4 feet on the side opposite the pump jack brace and should be left in place until the pump jack has been moved and the initial brace has been reinstalled.

5. If wood poles are used, make sure the lumber is straight-grained, free of shakes and large loose or dead knots and other imperfections that may reduce the strength of the wood.

6. If two consecutive lengths are used to form the wood poles, make sure the poles are connected together with the seam parallel to the bracket.
7. If two-by-four lumber is used to create a pole, make sure the splices are strong enough to maintain the full strength of the member.

8. Make sure workbenches are not used as scaffold platforms.

| 4. When inspecting a pump jack scaffold check that brackets, braces, and accessories are fabricated from _____.
|---|
a. plastic plates and angles
b. metal plates and angles
c. plastic weights and curves
d. metal weights and curves

Ladder Jack Scaffolds

A ladder jack scaffold is a simple device consisting of a platform resting on brackets attached to a ladder. Ladder jacks are primarily used in light applications because of their portability and cost effectiveness. When inspecting these platforms, check the following:

1. Check that all ladders used to support ladder jack scaffolds comply with 1926 Subpart X - Stairways and Ladders.

2. Make sure job-made ladders are NOT used to support ladder jack scaffolds.

3. Verify ladder jacks are designed and constructed to bear on:
   a. the side rails and ladder rungs
   b. the ladder rungs alone

4. If ladder jacks bear on the ladder rungs alone, check that the bearing area includes a length of at least 10 inches on each rung.

5. Make sure ladders used to support ladder jack scaffolds are:
   a. placed to prevent slipping
   b. fastened to prevent slipping
   c. equipped with devices to prevent slipping

6. Verify platforms are not being placed higher than 20 feet from the supported base. Make sure scaffold platforms are not being bridged together.

7. Verify the intent is not to exceed the ladder jack scaffold load limit of 25 pounds per square foot.
8. Verify not more than two employees are occupying any platform at one time.

9. Check that the maximum span between supports is no more than 8 feet.

5. What is the ladder jack scaffold load limit?
   a. 25 pounds per square foot
   b. 35 pounds or more per linear foot
   c. No more than 45 pounds per cubic foot
   d. 55 pounds per cubic inch

Inspecting Window Jack Scaffolds
A window jack scaffold is a supported scaffold consisting of a platform supported by a bracket or jack that projects through a window opening. When inspecting these scaffolds, check for the following:

1. Verify scaffolds are being securely attached to the window opening.

2. Verify scaffolds are being used only for working at the window opening through which the jack is placed.

3. Check to make sure window jacks are not being used to support planks or other elements of scaffolding placed between one window jack and another.

4. Verify not more than one employee is allowed to work on the scaffold at any one time.

6. How many employees are allowed work on a window jack at the same time?
   a. Up to three employees
   b. One or two employees
   c. Two employees
   d. Not more than one employee

Horse Scaffolds
A horse scaffold means a supported scaffold consisting of a platform supported by construction horses.

1. Make sure these scaffolds are no more than 10 feet or two tiers in height, whichever is less.

2. When horses are arranged in tiers, make sure:
   a. Each horse must be placed directly over the horse in the tier below.
b. The legs of each horse must be nailed down or otherwise secured to prevent displacement.

c. Each tier must be crossbraced.

3. Check construction of the scaffold to make sure it conforms to the following guidelines:

<table>
<thead>
<tr>
<th>Material</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum intended load (light duty)</td>
<td>25 pounds/foot²*</td>
</tr>
<tr>
<td>Maximum intended load (med. duty)</td>
<td>50 pounds/foot²*</td>
</tr>
<tr>
<td>Bearers (light duty)</td>
<td>2 x 4 inches</td>
</tr>
<tr>
<td>Bearers (medium duty)</td>
<td>3 x 4 inches</td>
</tr>
<tr>
<td>Legs</td>
<td>2 x 4 inches</td>
</tr>
<tr>
<td>Longitudinal bracing between legs</td>
<td>1 x 6 inches</td>
</tr>
<tr>
<td>Gusset braces at top of legs</td>
<td>1 x 8 inches</td>
</tr>
<tr>
<td>Half diagonal braces</td>
<td>2 x 4 inches</td>
</tr>
</tbody>
</table>

*Horses shall be spaced not more than 8 feet apart for light-duty loads, and not more than 5 feet apart for medium-duty loads. ([1926 Subpart L Appendix A (2)(f)]

7. What is the maximum height a horse scaffold can reach?

   a. Ten feet or two tiers, whichever is less
   b. Either 15 feet or three tiers
   c. Ten feet or one tier whichever is more
   d. Up to 15 feet or two tiers

**Crawling Board (Chicken Ladder) Scaffolds**

A crawling board (chicken ladder) is a supported scaffold consisting of a plank with cleats spaced and secured to provide footing for use on sloped surfaces such as roofs.

1. Make sure the crawling boards extend from the roof peak to the eaves when used in roof construction, repair, or maintenance.

2. Verify crawling boards are secured to the roof by:

   a. ridge hooks

   b. by means that provide equivalent strength and durability
3. Check that crawling boards are no less than 10 inches wide and 1 inch thick.

4. Check the cleats on crawling boards to make sure they:
   a. are equal in length to the width of the board
   b. are spaced at equal intervals not to exceed 24 inches
   c. have a minimum cross-sectional area of 1 x 1-1/2 inches

8. What is the minimum width allowed for crawling boards?
   a. 5 inches wide and 1/2 inch thick
   b. 10 inches wide and 1 inch thick
   c. 12 inches wide and 2 inches thick
   d. 18 inches wide and 2 inches thick

Step, Platform and Trestle Ladder Scaffolds
A step, platform and trestle ladder scaffold is a supported scaffold consisting of a platform supported directly on the rungs of step ladders or a building wall.

1. Verify scaffold platforms are placed no higher than the second-highest rung or step of the ladder supporting the platform.

2. Check that all ladders meet the requirements of 1926 Subpart X (Stairways and Ladders).

3. Ensure ladders are prevented from slipping by how they are placed, fastened or equipped.

4. Make sure job-made ladders are not permitted to be used for these scaffolds.

5. Make sure these scaffolds must not be bridged one to another.

Inspecting Plasterers', Decorators', and Large-Area Scaffolds
Check these scaffolds to make sure they are constructed in accordance with the requirements for the following scaffolds, as appropriate:

- pole scaffolds
- tube and coupler scaffolds
- fabricated frame scaffolds

Note: The guidelines for pole scaffolds, or tube and coupler scaffolds, may be applied.
9. What is the maximum height platforms may be placed on the ladders of Step, Platform, and Trestle Ladder Scaffolds?

   a. The highest rung or step
   b. The fourth-highest rung or step
   c. The third-highest rung or step
   d. The second-highest rung or step
Module 5: Inspecting Suspended Scaffolds

Introduction
Suspended scaffolds are platforms suspended by ropes, or other non-rigid means, from an overhead structure. Because two-point scaffolds are the most common type of suspended scaffold, this module uses the Two-Point scaffold to describe requirements that apply to all suspended scaffolds. Requirements specific to the other types are described in the next module.

Real-Life Accident
Scaffold with Improvised Components Fails; Worker Dies

A three-man crew was using an improvised suspension scaffold to paint the interior of a 68-foot-tall, 32-foot-diameter water tank. The scaffold consisted of an aluminum ladder used as a platform and secured to steel "stirrups" made of steel bar stock bent into a box shape and attached to each end of the ladder. Wire cables from each stirrup ran to a common tie-off point. A cable from this common tie-off was rigged to a block-and-tackle used from ground level to raise and lower the platform. The block-and-tackle supporting the system was secured to a vertical steel pipe on top of the tank by a cable, which was fashioned into a loop by U-bolting the dead ends of a piece of wire rope.

The victim had been painting from one end of this scaffold while wearing a safety belt and lanyard attached to an independent lifeline. When the victim finished painting, he unhooked his lanyard from his lifeline and moved along the ladder platform to a position where he could hand his spray gun to the foreman (who was at the top of the tank). As the foreman took the spray gun, he heard a "pop" and saw the scaffold and the victim fall 65 feet to the floor of the tank.

Investigation of the incident revealed that the two U-bolts on the loop of cable supporting the block-and-tackle had loosened enough to allow the cable ends to slip through, causing the scaffold to fall. This particular rig had been used without incident every day for two weeks preceding this fatal fall.

1. Which of the following is the most common type of suspended scaffold?
   a. Boatswain's chairs
   b. Outrigger suspended scaffold
   c. Two-point suspended scaffold
   d. Single-point suspended scaffold
**Two-Point Scaffolds**
Two-point adjustable suspension scaffolds, also known as swing-stage scaffolds, are perhaps the most common type of suspended scaffold. Hung by ropes or cables connected to stirrups at each end of the platform, they are typically used by window washers on skyscrapers, but play a prominent role in high-rise construction as well.

Note: Except where indicated, the same basic scaffold requirements that appear in this module also apply to single-point adjustable, multi-point adjustable, catenary, interior hung, needle-beam, multi-level, and float (ship) scaffolds which will be covered in the next module.

Let’s take a look at important inspection criteria for this scaffold.

**Inspecting the Anchorage**
The safe use of a suspended scaffold begins with secure anchorage. The weight of the scaffold and its occupants should be supported by both the structure to which it is attached and by each of the scaffold components that make up the anchorage system.

We will discuss each of the scaffold components below.

- tiebacks
- counterweights
- direct connections

Note: Except where indicated, these requirements for anchorages also apply to multi-level, single-point adjustable, multi-point adjustable, interior hung, needle-beam, catenary, and float (ship) scaffolds.

2. **Two-point adjustable scaffolds are typically used by _____.**
   a. masons
   b. window washers
   c. painters
   d. carpenters

**Anchorage Tiebacks**
The tiebacks should be secured to a structurally sound anchorage on the building or structure, which may include structural members. A good example would be an anchor mounted in concrete with drilled-in fasteners. In your inspection, make sure tiebacks are:

1. not secured by vents, electrical conduit, or standpipes and other piping systems
2. installed perpendicular to the face of the building or structure, or opposing angle tiebacks should be installed (single tiebacks installed at an angle are prohibited)

3. equivalent in strength to the suspension ropes and hoisting rope

Scenario

Workers Killed When Scaffolds Without Tiebacks Fall

Two employees were working on a two-point suspension scaffold without safety belts, lifeline, or tiebacks. They attempted to move a hook to reposition it when the hook slipped off the parapet, causing one end of the scaffold to drop. The victim fell five stories to his death. His co-worker was able to grab on to the scaffold and climbed to a fire escape.

3. Which of the following is a safe anchorage for tiebacks?

   a. A vent that is secured
   b. An electrical conduit mounted to a wall
   c. An anchor mounted in concrete with drilled-in fasteners
   d. A standpipe or other piping systems

Anchorage Counterweights

Safety factors for the counterweights, riggings, and direct connections to roofs, floors, and suspension ropes of adjustable suspension scaffolds should be based on the rated load and the stall load of the hoist, not the maximum intended load.

1. Make sure suspended scaffold outrigger beams are stabilized by:

   a. counterweights
   b. bolts or other direct connections to the floor or decks

2. Check that counterweights used to balance adjustable suspension scaffolds are capable of resisting:

   a. at least 4 times the tipping moment imposed by the scaffold when it is operating at the rated load of the hoist (see counterweight formula to the right)
   b. a minimum of 1½ times the tipping moment imposed by the scaffold when it is operating at the stall load of the hoist, whichever is greater

3. Ensure only items specifically designed as counterweights are used to counterweight scaffold systems.
4. Check to make sure masonry units, rolls of roofing felt, and other similar construction materials are not being used as counterweights.

5. Ensure counterweights are not made of flowable materials such as sand, gravel, and similar materials that can be easily dislocated. An acceptable material for use would be a counterweight made of cast iron.

6. Make sure counterweights are secured by mechanical means to the outrigger beams to prevent accidental displacement.

7. Counterweights should not be removed from an outrigger beam until the scaffold is disassembled.

Scenario

**Inadequate Counterweights Cause Two Deaths**

A 53-year-old painting foreman and a 28-year-old painter were killed when their scaffold collapsed. They were working on a 48-foot-high tank from a two-point suspension scaffold supported by two steel outriggers. The scaffold manufacturer specified 600 pounds of counterweight for this scaffold and load, but the painters had rigged the scaffold using only 200 pounds of counterweight (100 pounds per outrigger). The outriggers were not tied off or otherwise secured. No personal fall protection equipment was being used by either worker. While the two men were working on the scaffold, their weight caused the outriggers to slip, and the scaffold, rigging, and victims fell to the ground.

4. **What should be used to stabilize suspended scaffold outrigger beams?**
   
   a. Direct connections, forms, and lifelines
   b. Anchorages, suspension ropes, and counterweights
   c. Outrigger forms and base plates
   d. Counterweights, bolts, or other direct connections

**Direct Connections**

Direct connections and counterweights used to balance adjustable suspension scaffolds should resist at least four times the tipping force of the scaffold.

A competent person who directs the rigging of the scaffold should calculate the potential loads and confirm, based on the evaluation, that the supporting surfaces are capable of supporting the loads to be imposed.
• Make sure direct connections to roofs and floors are capable of resisting whichever of
the following is greater:
  o at least 4 times the tipping moment imposed by the scaffold when it is operating at
    the rated load of the hoist; or
  o a minimum of 1½ times the tipping moment imposed by the scaffold when it is
    operating at the stall load of the hoist.

Scenario
Foreman Dies When Overloaded Scaffold Falls
Six other boilermakers had just left a suspension scaffold when it fell about 392 feet along
with the foreman, who was killed. The superintendent had ordered the scaffold's main
support be disassembled before the scaffold was lowered to ground level. Rigging, welding
machines, materials and supplies, etc., were placed on the scaffold, and two 1-inch wire rope
hoist lines were cut free. This put the load on a single 3/4-inch wire rope hoist line, which was
overloaded by 255 percent, and on the diesel hoist located outside the chimney, which was
overloaded by 167 percent. The superintendent was in a rush to get the system disassembled
because a helicopter had been contracted to remove the structural members of the scaffold
support system on Monday.

5. Who should calculate the potential loads for suspension scaffolds?
   a. The OSHA inspector that is reviewing the work site
   b. An employee that has been on the job for a couple weeks and lacks experience
   c. A competent person who directs the rigging of the scaffold
   d. A project supervisor working installing the scaffold

Inspecting the Support
Adjustable suspension scaffolds are designed to be raised and lowered while occupied by workers
and materials and should be capable of bearing their load whether stationary or in motion. We
will look at each of the following topics related to supports:
• capacity
• components
• outrigger beams
• suspension ropes
- hoists

Note: Except where indicated, these requirements also apply to multi-level, single-point adjustable, multi-point adjustable, interior hung, needle beam, catenary, and float (ship) scaffolds.

**Scenario**

**Scaffold with Improvised Components Fails; Worker Dies**

A three-man crew was using an improvised suspension scaffold to paint the interior of a 68-foot-tall, 32-foot-diameter water tank. The scaffold consisted of an aluminum ladder used as a platform and secured to steel "stirrups" made of steel bar stock bent into a box shape and attached to each end of the ladder. Wire cables from each stirrup ran to a common tie-off point. A cable from this common tie-off was rigged to a block-and-tackle used from ground level to raise and lower the platform. The block-and-tackle supporting the system was secured to a vertical steel pipe on top of the tank by a cable, which was fashioned into a loop by U-bolting the dead ends of a piece of wire rope.

The victim had been painting from one end of this scaffold while wearing a safety belt and lanyard attached to an independent lifeline. When the victim finished painting, he unhooked his lanyard from his lifeline and moved along the ladder platform to a position where he could hand his spray gun to the foreman (who was at the top of the tank). As the foreman took the spray gun, he heard a "pop" and saw the scaffold and the victim fall 65 feet to the floor of the tank.

Investigation of the incident revealed that the two U-bolts on the loop of cable supporting the block-and-tackle had loosened enough to allow the cable ends to slip through, causing the scaffold to fall. This particular rig had been used without incident every day for two weeks preceding this fatal fall.

**6. Adjustable suspension scaffolds should be capable of bearing their load _____.**

a. when stationary and occupied by two workers  
b. whether stationary or in motion  
c. in all weather conditions and loads  
d. if the work adds weight to the load while suspended
Support Capacity

- Ensure scaffolds and scaffold components are capable of supporting, without failure, their own weight and at least 4 times their maximum intended load.

- Make sure each suspension rope, including connecting hardware, is capable of supporting, without failure, at least 6 times the maximum intended load applied to that rope while the scaffold is operating at the greater of either:
  - the rated load of the hoist
  - 2 times the stall load of the hoist

- Inspect to ensure all suspension scaffold support devices, such as outrigger beams, cornice hooks, and parapet clamps to ensure that:
  - they rest on surfaces capable of supporting at least 4 times the load imposed on them by the scaffold operating at the greater of either:
    - rated load of the hoist
    - 1½ times the stall capacity of the hoist
  - outrigger beams are installed at right angles to the face of the building and:
    - secured against movement with tiebacks and or the structure; or
    - by opposing angle tiebacks installed and secured to a structurally sound point of anchorage such as structural members other than vents, electrical conduit, or standpipes and other piping systems.

- they occupy no more than two employees occupy suspension scaffolds designed for a working load of 500 pounds (non-mandatory);

- they occupy no more than three employees occupy suspension scaffolds designed for a working load of 750 pounds (non-mandatory); and

- suspension scaffolds are altered only under the supervision and direction of a competent person.

Scenario

Foreman Dies When Overloaded Scaffold Falls
Six other boilermakers had just left a suspension scaffold when it fell about 392 feet along with the foreman, who was killed. The superintendent had ordered the scaffold's main support be disassembled before the scaffold was lowered to ground level. Rigging, welding machines, materials and supplies, etc., were placed on the scaffold, and two 1-inch wire rope hoist lines were cut free. This put the load on a single 3/4-inch wire rope hoist line, which was overloaded by 255 percent, and on the diesel hoist located outside the chimney, which was overloaded by 167 percent. The superintendent was in a rush to get the system disassembled because a helicopter had been contracted to remove the structural members of the scaffold support system on Monday.

7. How much weight should scaffolds and scaffold components be able to support?

   a. The weight of the scaffold and all workers and loaded materials
   b. Their own weight and at least 2 times their maximum intended load
   c. Their own weight and at least 3 times their maximum intended load
   d. Their own weight and at least 4 times their maximum intended load

Inspecting Outrigger Beams

Outrigger beams (thrustouts) are the structural members of a suspension or outrigger scaffolds that provide support. Before first use, a competent person must evaluate the outrigger beam direct connections to determine that the supporting surfaces are capable of bearing the loads that will be imposed on them. During your inspection of outrigger beams, check that:

   ▪ they are made of structural metal, or other material of equivalent strength;
   ▪ they are restrained to prevent movement;
   ▪ they have stop bolts or shackles at both ends;
   ▪ they are securely fastened together with the flanges turned out when channel iron beams are used instead of I-beams;
   ▪ they are installed with all bearing supports perpendicular to the beam center line;
   ▪ they are set and maintained with the web in a vertical position;
   ▪ they are attached to the scaffold ropes by a shackle or clevis placed directly over the stirrup;
   ▪ their inboard ends are stabilized by bolts or other direct connections to the floor or roof deck, or by counterweights;
• they are secured by tiebacks if outrigger beams are not stabilized by bolts or other direct connections to the floor or roof deck.

• they are placed at a perpendicular (horizontal 90-degree angle) to their bearing support (usually the face of the building) when feasible;

• they are placed at some an acceptable angle, with opposing-angle tiebacks if perpendicular placement is not possible because of obstructions that cannot be moved.

Real Life Accident
Failed Outrigger Leads to Fatality
Two employees were painting the exterior of a three-story building when one of the two outriggers on their two-point suspension scaffold failed. One painter safely climbed back onto the roof while the other fell approximately 35 feet to his death. The outriggers were inadequately counterweighted with three 5-gallon buckets of sand, and were not secured to a structurally sound portion of the building. Neither painter was wearing an approved safety belt and lanyard attached to an independent lifeline.

8. At what angle must outrigger beams be placed relative to their bearing support?
   a. At a 30-degree angle or less
   b. At least a 45-degree tangential angle
   c. A perpendicular (90-degree) angle
   d. At a 180-degree opposed to the bearing support

Inspecting Suspension Ropes

1. Check suspension ropes supporting adjustable suspension scaffolds to ensure they have a diameter large enough to permit proper functioning of brake and hoist mechanisms.

2. Make sure the use of repaired wire rope as suspension rope is prohibited.

3. Ensure wire suspension ropes are not joined together except through the use of eye splice thimbles connected with shackles or coverplates and bolts.

4. Make sure the load end of wire suspension ropes are equipped with proper-size thimbles, and secured by eyesplicing or equivalent means.

5. Ensure competent persons are inspecting ropes for defects prior to each work shift, and after every occurrence which could affect a rope’s integrity.
6. Check that ropes are replaced when any of the following conditions exist:
   a. any physical damage which impairs the function and strength of the rope
   b. kinks that might impair the tracking or wrapping of the rope around the drum or sheave of the hoist
   c. six randomly distributed wires are broken in one rope lay, or three broken wires in one strand in one rope lay
   d. loss of more than one-third of the original diameter of the outside wires due to abrasion, corrosion, scrubbing, flattening, or peening
   e. heat damage caused by a torch, or any damage caused by contact with electrical wires
   f. evidence that the secondary brake has been activated during an overspeed condition and has engaged the suspension rope

9. When do scaffold suspension ropes need to be replaced?
   a. When four randomly distributed wires are broken in one rope lay
   b. When any physical damage impairs the function and strength of the rope
   c. When the rope has never been used and there is no apparent damage
   d. After every use

7. Ensure swaged attachments or spliced eyes on wire suspension ropes are not used unless they are made by the manufacturer or a qualified person.

8. When wire rope clips are used on suspension scaffolds, ensure:
   a. A minimum of 3 clips are installed, with the clips a minimum of 6 rope diameters apart.
   b. Clips are installed according to the manufacturer's recommendations.
   c. Clips are retightened to the manufacturer's recommendations after the initial loading.
   d. Clips are being inspected and retightened to the manufacturer's recommendations at the start of each subsequent work shift.
   e. U-bolt clips are not being used at the point of suspension for any scaffold hoist.
f. When U-bolt clips are used, the U-bolt is placed over the dead end of the rope, and the saddle is placed over the live end of the rope.

1. Make sure suspension ropes are being shielded from heat-producing processes.

2. When acids or other corrosive substances are used on a scaffold, ensure the ropes are:
   a. shielded
   b. treated to protect against the corrosive substances
   c. are of a material that will not be damaged by the substances

10. When inspecting wire rope clips on suspension scaffolds, ensure _____.
    a. the saddles are a minimum of 3 rope diameters apart
    b. a minimum of 3 clips are installed
    c. clips are a minimum of 6 rope diameters apart
    d. clip bolts are not placed over the dead end

**Inspecting Hoists**

A mechanical device is used to raise or lower a suspended scaffold. It can be mechanically powered or manually operated. When inspecting hoists check each of the following:

1. Verify the stall load of the scaffold hoist does not exceed 3 times its rated load.

2. When winding drum hoists are used and the scaffold is extended to its lowest point of travel, ensure there is enough rope to wrap four times around the drum.

3. When other types of hoists are used, make sure the suspension ropes are long enough to allow the scaffold to travel to the level below without the rope end passing through the hoist, or else make sure the rope end provides a means to prevent the end from passing through the hoist.

4. Make sure power-operated and manual hoists have been tested and listed by a qualified testing laboratory.

5. Ensure gasoline-powered hoists are not used on suspension scaffolds.

6. Check gears and brakes of power-operated hoists used on suspension scaffolds to make sure they are properly enclosed.
7. In addition to the normal operating brake, make sure that both power-operated and manual hoists have a braking device or locking pawl which engages automatically when a hoist experiences:

   a. instantaneous change in momentum

   b. accelerated overspeed episode

8. Verify manually operated hoists have a positive crank force to descend.

Note: Many scaffold failures occur early in the morning, after condensation has collected on the wire ropes overnight. The preferred industry practice at the beginning of a shift is to raise the scaffold 3 feet, hit the brakes, then lower the scaffold and hit the brakes again. This ensures that moisture on the wire rope will not allow it to slip through the braking mechanism, causing the scaffold to fall.

Scenario

Failed Scaffold Hoists Cause Worker Death

Three workers were on a two-point suspension scaffold rated at 500 lbs. working weight. As the employees went up in the scaffold, the right side fell to the ground from an elevation of 20 feet. One worker managed to hold on, the other two fell with the scaffold, resulting in one worker dying and the other being hospitalized for extensive injuries. Investigation indicated that the scaffold motor assembly was improperly connected to the scaffold platform. The workers were wearing the available safety harnesses and lifelines but had not connected the lifelines.

11. What is the preferred industry practice to help ensure that moisture on a hoist wire rope will not slip through the braking mechanism?

   a. Manually raise and lower the scaffold using a crank
   b. Shake the wire rope vigorously to remove moisture
   c. Wipe all rope with a dry rag to remove moisture
   d. Raise then lower the scaffold, and test the brakes
Module 6: Inspecting Special Use Suspended Scaffolds

Inspecting Single-Point Adjustable Scaffolds
A single-point adjustable scaffold consists of a platform suspended by one rope from an overhead support and equipped with means to permit the 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 building.

1. Make sure the supporting rope between the scaffold and the suspension device is kept vertical, unless:
   a. The rigging has been designed by a qualified person.
   b. The scaffold is accessible to rescuers.
   c. The support rope is protected from rubbing during direction changes.
   d. The scaffold is positioned so swinging cannot bring it into contact with other surfaces.

2. Make sure, when combining two single-point scaffolds to form a two-point suspension system, the resulting scaffold comply with 1926.452(p) requirements.

3. Check that the maximum intended load for single-point adjustable suspension scaffolds is 250 pounds.

1. What is the maximum intended load for single-point adjustable suspension scaffolds?
   a. 200 pounds
   b. 250 pounds
   c. 300 pounds
   d. 350 pounds

Inspecting Boatswain's Chairs
A Boatswain's Chair is a suspended seat designed to accommodate one worker in a sitting position. It is most commonly used by window washers to clean the outside of buildings. It may be also used to clean the inside of storage tanks, etc.

1. Check to make sure boatswain's chair tackle consists of the following:
   a. correct-size ball bearings or bushed blocks containing safety hooks
b. properly eye-spliced first-grade manila rope, or other rope of equivalent strength and durability

2. Inspect seat slings to make sure they:
   a. pass through four corner holes in the seat
   b. cross on the underside of the seat
   c. are rigged to prevent slippage which could cause the chair to be out-of-level
   d. are at least 5/8-inch diameter fiber, synthetic, or other first-grade manila rope of equivalent criteria (strength, slip resistance, durability, etc.)
   e. seat slings used for gas or arc welding are made of at least 3/8-inch wire rope

3. Check to make sure non-cross-laminated wood chairs are reinforced on the underside with cleats to keep the board from splitting.

4. Check wood seats for boatswain’s chairs to make sure they are:
   a. no less than 1 inch thick (if made of non-laminated wood)
   b. 5/8-inch thick (if made of marine-quality plywood)

2. Which of the following is approved for a boatswain's chair sling rope when the worker is washing windows?
   a. Any size quality fiber rope
   b. Not less than 1/2-inch synthetic rope
   c. At least 3/8-inch approved wire rope
   d. At least 5/8-inch diameter first-grade manila rope

Inspecting Catenary Scaffolds
A catenary scaffold is a suspension scaffold consisting of a platform fastened to two essentially horizontal and parallel ropes, which are secured to structural members. Horizontal ropes are usually supported by intermediate vertical pickup ropes to reduce sag and anchorage load.

1. Make sure catenary scaffolds do not have:
   a. more than one platform between consecutive vertical pickups
   b. more than two platforms altogether
1. Ensure platforms supported by wire rope have hook-shaped stops on each of the platforms to prevent them from slipping off the wire ropes. Make sure these hooks are positioned so they prevent the platform from falling if one of the horizontal wire ropes breaks.

2. Look to determine if wire ropes are not over-tightened to the point that a scaffold load will overstress them.

3. Make sure wire ropes are continuous without splices between anchors.

4. Ensure each employee is protected by a personal fall-arrest system (PFAS). Note: The use of body belts is prohibited.

5. Check to see if the scaffolds maximum intended load of 500 pounds is not exceeded.

6. Make sure that no more than two employees at a time are permitted on the scaffold.

7. Ensure the maximum capacity of each come-along is 2,000 pounds.

8. Make sure vertical pickups are spaced no more than 50 feet apart.

9. Make sure ropes are equivalent in strength to at least ½ inch-diameter improved plow steel wire rope.

### 3. What does an employee need to be protected by when working on catenary scaffolds?

- a. A fall-restraint system (PFRS)
- b. A body belt
- c. A personal fall-arrest system (PFAS)
- d. A safety net

**Inspecting Multiple-Point Adjustable Scaffolds**

A multiple-point adjustable suspension scaffold is a suspension scaffold consisting of a platform(s) suspended by more than two ropes from overhead supports and equipped with means to permit the raising and lowering of the platform to desired work levels.

**Video demonstrating a Multi-point Scaffold in Seneca Niagara Casino**

- A stone setter’s multiple-point adjustable suspension scaffold is a two-point or multiple-point adjustable suspension scaffold designed and used for stone setting operations.

- A mason’s adjustable suspension scaffold is a two-point or multiple-point adjustable suspension scaffold designed and used for masonry operations.
When inspecting multi-point adjustable scaffolds, check for each of the following:

1. Make sure multi-point adjustable scaffolds are suspended only from:
   a. metal outriggers
   b. brackets
   c. wire rope slings
   d. hooks
   e. means that meet equivalent criteria for strength, durability, etc.

2. When two or more scaffolds are used they are not bridged together unless:
   a. their design allows them to be connected
   b. the bridge connections are articulated
   c. the hoists are properly sized

3. If bridges are not used, make sure the passage between platforms is made only when they are at the same height and are abutting.

When inspecting a mason’s multi-point adjustable suspension scaffold, check each of the following:

1. Make sure that for a maximum intended load of 50 pounds per square foot, each outrigger beam is at least a standard 7 inch, 15 foot, 15.3 pound steel I-beam.

2. Make sure outrigger beams do not project more than 6 feet 6 inches beyond the bearing point.

3. Make sure overhangs exceeding 6 feet 6 inches are composed of stronger outrigger beams or multiple beams.

4. Multi-point adjustable scaffolds are typically _____.
   a. used for loads under 100 pounds
   b. suspended by at least one rope
   c. used by masons and stone setters
   d. meant to be a replacement scaffold only
Inspecting Multi-Level Suspended Scaffolds
A multi-level suspended scaffold is a two-point or multiple-point adjustable suspension scaffold with a series of platforms at various levels supported by common stirrups.

1. Make sure multi-level suspended scaffolds are equipped with additional independent support lines:
   a. equal in number to the number of points supported
   b. equal in strength to the suspension ropes
   c. rigged to support the scaffold if the suspension ropes fail
2. Ensure support lines and suspension ropes are not anchored to the same points.
3. Check to make sure supports for platforms are attached directly to support stirrups (not to other platforms).

5. What should supports for platforms be directly attached to?
   a. Platform points
   b. Support stirrups
   c. Other platforms
   d. Suspension ropes

Inspecting Float (Ship) Scaffolds
A float (ship) scaffold is a suspension scaffold consisting of a braced platform resting upon two parallel bearers and hung from overhead supports by ropes of fixed length.

1. Make sure platforms are supported by, and securely fastened to, a minimum of two bearers extending at least 6 inches beyond the platform on both sides.
2. Ensure rope connections do not allow the platform to shift or slip.
3. Check to make sure only two ropes are used with each float.
4. Make sure ropes are arranged to provide four ends that are securely fastened to overhead supports, and that each rope:
   a. is hitched to one end of the bearer
   b. passes under the platform and is hitched again at the other end
5. Ensure each employee on a float (ship) scaffold is protected by a personal fall-arrest system.

6. Check for the following for maximum intended loads of 750 pounds:
   a. Platforms are made of ¾-inch plywood.
   b. Bearers are made from 2 x 4-inch or 1 x 10-inch rough lumber, and free of knot and flaws.
   c. Ropes have a strength equivalent to at least 1 inch-diameter, first-grade manila rope.

6. What must each employee on a float (ship) scaffold be protected by?
   a. A personal fall-arrest system (PFAS)
   b. Support stirrups
   c. Body belts
   d. Guardrails

Inspecting Interior Hung Scaffolds
An interior hung scaffold is a suspension scaffold consisting of a platform suspended from the ceiling or roof structure by fixed length supports.

1. Make sure interior hung scaffolds are suspended from roof structures (e.g., ceiling beams).

2. Make sure roof structures are inspected for strength before scaffolds are erected.

3. Ensure suspension ropes/cables are connected to overhead supports by shackles, clips, thimbles, or equivalent means.

4. Check bearers to ensure they have dimensions of 2 x 10 inches and are used on edge.

5. Check or an intended maximum load of 25 to 50 lbs. per square foot, the maximum span is 10 feet.

6. Check or an intended maximum load of 75 lbs. per square foot, the maximum span is 7 feet.
7. Which of the following would be a proper suspension for interior hung scaffolds?
   a. Light posts
   b. Hanging fans
   c. Hanging lights
   d. Ceiling beams

Inspecting Needle Beam Scaffolds
This simple type of scaffold consists of a platform suspended from needle beams, usually attached on one end to a permanent structural member.

1. Make sure scaffold support beams must be installed on edge.
2. Ensure ropes or hangers are being used for supports. (Exception: One end of the scaffold may be supported by a permanent structural member.)
3. Check that ropes are securely attached to needle beams.
4. Make sure support connections are arranged to prevent the needle beam from rolling or becoming displaced.
5. Check to make sure platform units are attached by bolts or equivalent means. Cleats and overhang are not considered adequate means of attachment.

For a maximum intended load of 25 pounds per square foot, check for the following:

1. Ensure beams are at least 4 x 6 inches in cross section, with a maximum beam span of 10 feet, and the platform span is no more than 8 feet.
2. Ensure ropes are attached to the needle beam by a scaffold hitch or eye splice, and that the loose end is tied by a bowline knot or a round turn and a half hitch.
3. Make sure the rope strength is at least be equal to 1-inch diameter, first-grade manila rope.

8. What is the recommended maximum intended load for a needle beam scaffold?
   a. 15 pounds per square foot
   b. 20 pounds per square foot
   c. 25 pounds per square foot
   d. 30 pounds per square foot
Glossary

Adjustable suspension scaffold: A suspension scaffold with a hoist (or hoists) operated by workers on the scaffold.

Aerial Device: Any vehicle mounted, telescoping or articulating, or both, used to position personnel (workers).

Aerial Ladder: An aerial device consisting of a single or multiple-section extensible ladder.

Articulating Boom Platform: An aerial device with two or more hinged boom sections.

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

Baluster: A short vertical pillar used to supporting a guardrail.

Base Plate: A device used to distribute vertical load.

Bearer: A horizontal transverse scaffold member (which may be supported by ledgers or runners) upon which the scaffold platform rests and joins scaffold uprights, posts, poles and similar members.

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

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.

Brace: A tie that holds one scaffold member in a fixed position with respect to another member. Brace also means a rigid type of connection holding a scaffold to a building or structure.

Bricklayer’s square scaffold: A supported scaffold made of framed squares that supports a platform.

Carpenter’s bracket scaffold: A supported scaffold consisting of a platform supported by brackets attached to a building or structural walls.

Catenary scaffold: A suspension scaffold consisting of a platform supported by two horizontal and parallel ropes attached to structural members of a building or other structure.

Chimney hoist: A multipoint adjustable suspension scaffold that provides access for working inside chimneys. See “Multipoint adjustable suspension scaffold.”

Cleat: A structural member used at the ends of platform units to prevent the units from slipping off their supports. Cleats are also used to provide footing on sloped surfaces such as crawling boards.
**Come-along:** A hand operated ratchet lever winch used to wind a rope or cable, while a ratchet is a mechanical brake that keeps the line from unwinding.

**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.

**Continuous-run scaffold (run scaffold):** A two-point or multipoint adjustable suspension scaffold made from braced scaffold members or supporting structures that form a continuous scaffold.

**Coupler:** A device for locking together the component tubes of a tube and coupler scaffold.

**Crawling board (chicken ladder):** A supported scaffold consisting of a plank with cleats spaced and secured to provide footing.

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

**Deceleration device:** Any mechanism that dissipates energy during a fall arrest or limits the energy imposed on a worker during fall arrest

**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.

**Double-pole (independent pole) scaffold:** A supported scaffold consisting of a platform resting on bearers supported by ledgers and a double row of uprights not supported (except with ties, guys, braces) by any other structure

**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.

**Equivalent:** An alternative design, material or method that the employer can demonstrate will provide an equal or greater degree of safety for employees than the method or item specified in the standard.

**Extensible Boom Platform:** An aerial device (except ladders) with a telescopic or extensible boom. Telescopic derricks with personnel platform attachments are considered to be extensible boom platforms when used with a personnel platform.

**Eye or eye splice:** A loop with or without a thimble at the end of a wire rope.

**Fabricated decking and planking:** Manufactured platforms made of wood (including laminated wood and sawn-wood planks), metal, or other materials.
Fabricated-frame scaffold (welded tubular-frame scaffold): A scaffold consisting of a platform supported on fabricated end frames with integral posts, horizontal bearers, and intermediate members.

Failure: Breakage or separation of component parts

Fall Protection: A system designed to prevent or arrest a person’s fall.

Float (ship) scaffold: A suspension scaffold consisting of a braced platform resting on two parallel bearers and hung from overhead supports by fixed-length ropes.

Form scaffold: A supported scaffold consisting of a platform supported by brackets attached to formwork.

Galvanic action: Process when two dissimilar metals in contact and one of the metals corrodes due to electrochemical action.

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.

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

Harness: A design of straps that is secured about the employee in a manner to distribute the arresting forces over at least the thighs, shoulders and pelvis, with provisions for attaching a lanyard, lifeline or deceleration device.

Hoist: A mechanical device to raise or lower a suspended scaffold. It can be mechanically powered or manually operated.

Horse scaffold: A supported scaffold consisting of a platform supported by construction horses (sawhorses). Horse scaffolds made of metal are also called trestle scaffolds.

Independent-pole scaffold: See “double-pole scaffold.”

Insulated Aerial Device: An aerial device designed for work on energized lines and apparatus.

Interior hung scaffold: A suspension scaffold consisting of a platform suspended from a ceiling or roof structure by fixed-length supports.

Joint: The location where vertical members of a scaffold are combined.

Ladder jack scaffold: A supported scaffold consisting of a platform resting on brackets attached to ladders.

Ladder Stand: A mobile, fixed-size, self-supporting ladder that appears as a wide flat tread ladder in the form of stairs.

Landing: A platform at the end of a flight of stairs.
**Large area scaffold:** A pole scaffold, tube-and-coupler scaffold, systems scaffold, or fabricated frame scaffold erected over an entire work area.

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

**Lean-to scaffold:** A supported scaffold that is kept erect by tilting toward and resting against a building or structure.

**Ledger:** A horizontal scaffold member upon which bearers rest. It is the longitudinal member that joins scaffold uprights, posts, poles and similar members.

**Lifeline:** A flexible line that connects to an anchorage at one end and hangs vertically (vertical lifeline) or that connects to anchorages at both ends and stretches horizontally (horizontal lifeline); it connects other components of a personal fall-arrest system to the anchorage.

**Lower levels:** Areas below the working level. Examples: ground levels, floors, roofs, ramps, runways, excavations, pits, tanks, materials, water, and equipment.

**Mason’s adjustable supported scaffold:** See “Self-contained adjustable scaffold.”

**Mason’s multipoint adjustable suspension scaffold:** A continuous-run suspension scaffold designed and used for masonry work.

**Maximum Intended Load:** The total load of all employees, equipment, tools, materials, transmitted loads, wind loads, and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.

**Mechanically Powered Hoist:** A hoist that is powered by other than human energy.

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

**Mobile scaffold:** A portable caster or wheel-mounted supported scaffold.

**Multilevel suspended scaffold:** A two-point or multipoint adjustable suspension scaffold with platforms at various levels that rest on common stirrups.

**Multipoint adjustable suspension scaffold:** A suspension scaffold consisting of a platform suspended by more than two ropes from overhead supports that can be raised and lowered to desired work levels. Includes chimney hoists.

**Needle-beam scaffold:** A platform suspended from needle beams.

**Open Sides and Ends:** The edges of a platform that are more than 14 inches away from a sturdy, continuous, vertical surface (such as a building wall) or a sturdy, continuous, horizontal surface (such as a floor), or a point of access. Exception: For plastering and lathing operations, the horizontal distance is 18 inches.
**Outrigger**: The structural member of a supported scaffold used to increase the base width of a scaffold in order to provide greater stability for the scaffold.

**Outrigger Beam (thrustout)**: The structural member of a suspension scaffold or outrigger scaffold that provides support for the scaffold by extending the scaffold point of attachment to a point out and away from the structure or building.

**Outrigger scaffold**: A supported scaffold consisting of a platform resting on outrigger beams projecting beyond the wall or face of a structure; the inboard ends are secured inside the structure.

**Overhand bricklaying**: Laying bricks and masonry units so that the surface of the wall to be jointed requires the mason to lean over the wall to complete the work.

**Periodic**: For scaffolds, “periodic” means frequently enough so that, in light of these factors and the amount of time expected for their detrimental effects to occur, there is a good likelihood that problems will be found before they pose a hazard to employees.

**Personal Fall Arrest System** : A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline or suitable combinations of these. The use of a body belt for fall arrest is prohibited.

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

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

**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.

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

**Platform**: The horizontal working surface of a scaffold.

**Platform**: Any personnel-carrying device (basket or bucket) that is a component of an aerial device.

**Platform Unit**: The individual wood planks, fabricated planks, fabricated decks and fabricated platforms that compose the platforms and walkways of a scaffold.

**Pole scaffold**: See “Single-pole scaffold” and “Double (independent) pole scaffold.”

**Positioning Device System**: A body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.
**Power-operated hoist:** A hoist powered by other than human energy.

**Pump jack scaffold:** A supported scaffold consisting of a platform supported by vertical poles and movable support brackets.

**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.

**Rated Load:** The manufacturer’s recommended maximum load.

**Repair bracket scaffold:** A supported scaffold consisting of a platform supported by brackets secured around the circumference or perimeter of a chimney, stack, tank, or other supporting structure.

**Roof-bracket scaffold:** A rooftop-supported scaffold consisting of a platform resting on angular-shaped supports.

**Runner (ledger or ribbon):** The lengthwise horizontal bracing or bearing member that supports bearers on tube and coupler scaffolds.

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

**Scaffold:** Any temporary elevated or suspended platform and its supporting structure used for supporting employees or materials or both, except this term does not include crane or derrick suspended personnel platforms.

**Scissor Lift:** A self-propelled or manually propelled lifting personnel platform (within wheel base) capable of vertical movement with onboard controls as defined by ANSI/SIA A92.6-1990.

**Self-contained adjustable scaffold:** A combination supported and suspension scaffold consisting of an adjustable platform mounted on an independent supporting frame not a part of the object worked on. Examples: rolling roof rigs, rolling outrigger systems, and some mason’s adjustable supported scaffolds.

**Shore scaffold:** A supported scaffold placed against a structure and held in place with props.

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

**Shore scaffold:** A supported scaffold placed against a structure and held in place with props.

**Single-point adjustable suspension scaffold:** A suspension scaffold consisting of a platform suspended by one rope from an overhead support and equipped to move the platform to desired work levels.
**Single-pole scaffold:** A supported scaffold consisting of a platform resting on bearers. The outside ends are supported on runners secured to a single row of posts or uprights and the inner ends are supported by a structure.

**Stair tower (scaffold stairway/tower):** A tower that contains internal stairways and rest platforms. Used to provide access to scaffold platforms and other elevated points such as floors and roofs.

**Stall load:** The load at which a power-operated hoist stalls or the power is automatically disconnected.

**Step, platform, and trestle ladder scaffold:** A platform resting directly on the rungs of stepladders or trestle ladders.

**Stilts:** A pair of poles or supports with raised footrests, used to walk above the ground or working surface.

**Stonesetter's multipoint adjustable suspension scaffold:** A continuous-run suspension scaffold designed and used for stonesetter's work.

**Supported scaffold:** One or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support.

**Suspension scaffold:** One or more platforms suspended by ropes or other non-rigid means from an overhead structure(s).

**System scaffold:** A scaffold consisting of posts with fixed connection points that accept runners, bearers, and diagonals interconnected at predetermined levels.

**Tank builder's scaffold:** A supported scaffold consisting of a platform resting on brackets directly attached to a cylindrical tank or attached to devices that are attached to a tank.

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

**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.

**Top-plate bracket scaffold:** A scaffold supported by brackets that hook over or are attached to the top of a wall. Similar to carpenter's bracket scaffolds and form scaffolds and used in residential construction for setting trusses.

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

**Tube-and-coupler scaffold:** A supported or suspended scaffold consisting of a platform or platforms supported by tubing, erected with coupling devices connecting uprights, braces, bearers, and runners.
**Tubular welded-frame scaffold:** See “Fabricated frame scaffold.”

**Two-point suspension scaffold (swing stage):** A suspension scaffold consisting of a platform supported by hangers (stirrups) suspended by two ropes from overhead supports and equipped to raise and lower the platform to desired work levels.

**Unstable objects:** Objects that could become dislocated, shift, and not support the loads imposed on them. Unstable objects do not constitute a safe base support for scaffolds, platforms, or workers. Examples: barrels, boxes, loose brick, and concrete blocks.

**Uplift:** Uplift is the separation of a scaffold frame from the frame below it.

**Vertical Pickup:** A rope used to support the horizontal rope in catenary scaffolds.

**Walkway:** A portion of a scaffold platform used only for access and is not a work level.

**Window jack scaffold:** A platform resting on a bracket or jack that projects through a window opening.

**Work Level:** An elevated platform used for supporting employees and their materials where work activities are performed.

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