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OSHAcademy Course 804 Study Guide

Safe Scaffold Erection and Inspection

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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…”

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 develop to make sure the scaffold is erected properly.

Successful pre-planning activities include the following:

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.
Footing
Support scaffold footings must be level and capable of supporting the loaded scaffold. The legs, poles, frames, and uprights must bear on base plates and mud sills.

a. Keep the scaffold level, plumb, and square.

b. Don’t use bricks, blocks, barrels, or other unstable objects to level a scaffold.

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 now 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.

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.
<table>
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<tr>
<th>TYPE OF SCAFFOLD</th>
<th>FALL PROTECTION REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial lifts</td>
<td>Personal fall arrest system</td>
</tr>
<tr>
<td>Boatswains’ chair</td>
<td>Personal fall arrest system</td>
</tr>
<tr>
<td>Catenary scaffold</td>
<td>Personal fall arrest system</td>
</tr>
<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)</td>
</tr>
<tr>
<td></td>
<td>diameter grabline or equivalent handhold securely fastened beside each</td>
</tr>
<tr>
<td></td>
<td>crawling board</td>
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<td>Float scaffold</td>
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<tr>
<td>Self-contained scaffold</td>
<td>Both a personal adjustable scaffold arrest system and a guardrail system</td>
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<tr>
<td>Single-point and two-point suspension</td>
<td>Both a personal fall arrest system and a guardrail system</td>
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<td>scaffolds</td>
<td></td>
</tr>
<tr>
<td>Supported scaffold</td>
<td>Personal fall arrest system and a guardrail system</td>
</tr>
<tr>
<td>All other scaffolds not specified</td>
<td>Personal fall arrest system or guardrail systems that meet the required criteria</td>
</tr>
</tbody>
</table>
Heat Sources
Identify heat sources like steam pipes. Anticipate the presence of hazards 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.

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.

Crossbracing is too high in this photo. The “x” must be between 38 and 48 inches above the platform. Note: There are no toeboards, which can cause a struck-by hazard.
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.

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.

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).

**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.

**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.
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

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.

There are at least three violations in this photo. Can you spot them? (Hint: Access and Fall Protection)
Module 1 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

1. Which of the following activities helps to ensure successful scaffold preplanning?
   a. assessing the need for on-site evaluation
   b. close coordination with local government agencies
   c. determining the maximum load of the scaffold
   d. general contractor go-ahead

2. While working on scaffolds, workers should maintain, at a minimum, which of the following clearance distances from power lines?
   a. 2 feet for insulated lines less than 300 volts
   b. 15 feet for insulated lines of 500 volts or more
   c. 1 foot for insulated lines less than 50 volts
   d. 10 feet for insulated lines 300 volts or more

3. Generally, how far may a platform extend beyond its support when the scaffold is longer than 10 feet in length?
   a. up to 6 inches
   b. 6 to 12 inches
   c. more than 18 inches
   d. no more than 18 inches

4. Which of the following is a basic requirement for scaffold work?
   a. do not use scaffolds in high winds or during storms
   b. report any problems to the local OSHA office
   c. make sure scaffold are approved by safety officers
   d. ensure wood scaffold are not wet when in use
5. Which of the following is a basic requirement for inspecting scaffolds?

   a. report inspection results to the local OSHA office
   b. check all components, such as foundation, platforms, and fall protection
   c. make sure scaffold inspections are conducted only by safety officers
   d. ensure scaffold inspection results are not altered
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.

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.

**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.

*Poor foundation: Scaffold end frames, which have no base plate, are erected on top of scrap wood and unstable cement blocks.*
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.

**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!
Scenario

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.

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.

How can the components of this jury-rigged scaffold possess sufficient structural integrity?
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.

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.

**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.

**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

**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](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=38921).

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.

**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.

**Guardrail Systems**
Guardrail systems must be installed along all open sides and ends of platforms, and must be in place before the scaffold is released for use by employees other than erection/dismantling crews.

Make sure walkways located within a scaffold have guardrail systems installed within 9½ inches of, and along at least one side of the walkway.
1. Verify each toprail or equivalent member of a guardrail system is able to withstand a force of at least 200 pounds applied in any downward or horizontal direction, at any point along its top edge.

2. Measure to ensure the top edge height of toprails on supported scaffolds are between 36 inches and 45 inches. When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria. (The minimum top edge height on scaffolds manufactured or placed in service after January 1, 2000 is 38 inches).

3. Verify that midrails, screens, mesh, intermediate vertical members, solid panels, etc., are able to withstand a force of at least 150 pounds applied in any downward or horizontal direction, at any point along the midrail or other member.

4. When midrails are used, check to ensure they are installed at a height approximately midway between the top edge of the guardrail system and the platform surface.

5. When screens and mesh are used, check to ensure they extend from the top edge of the guardrail system to the scaffold platform, and along the entire opening between the supports.

6. When intermediate members (such as balusters or additional rails) are used, check to ensure they are no more than 19 inches apart.

7. Ensure guardrails are surfaced to prevent punctures or lacerations to employees and to prevent snagging of clothing, which may cause employees to lose their balance.
8. Make sure the ends of rails do not extend beyond their terminal posts, unless they do not constitute a projection hazard to employees.

9. If crossbracing is used in lieu of guardrails, the crossbracing may serve as a toprail or midrail, providing the crossing point is:
   a. between 20 and 30 inches above the work platform for a midrail
   b. between 38 and 48 inches above the work platform for a toprail

Scenario

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.

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.

Each end of platform, unless cleated or otherwise restrained by hooks, must extend over support by at least six inches.
Module 2 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

1. Which of the following are the most common type of scaffold because they are versatile, economical, and easy to use?
   a. fabricated frame scaffolds
   b. suspended scaffolds
   c. aerial lifts
   d. multi-level scaffolds

2. Ensure forklifts are not used to support scaffold platforms unless the entire platform is attached to the fork, and the forklift is not moved horizontally ______.
   a. while the ground is wet
   b. in poor weather conditions
   c. while the platform is occupied
   d. unless workers are tied off

3. What can happen if component parts made of dissimilar metals are used together on a scaffold?
   a. bonding
   b. loosening
   c. lengthening
   d. corrosion

4. While inspecting, you notice a worker’s lanyard attached to a building’s electrical conduit. What should you tell the worker?
   a. lanyards must be attached only to vertical/horizontal lifelines or scaffold structural member
   b. lanyards must be attached using a bowline knot
   c. lanyards may be attached only to the building’s structural member
   d. lanyards may be tied off only if approved by a competent person
5. **During your inspection, you notice workers improperly moving platforms to the next level. What do you tell the workers?**

   a. Check with the site's competent person before dismantling the existing level prior to moving to the new level.
   b. Dismantling existing platforms is prohibited until at least half of the next level platform has been installed.
   c. Never install the next level of platforms until the existing level has been dismantled.
   d. Existing platforms must be left undisturbed until the new end frames have been set in place and braced.
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.

A registered professional engineer may need to be consulted about the design, construction, and loading of the scaffold.

1. Verify tube and coupler scaffolds more than 125 feet high are designed by a registered professional engineer and constructed and loaded consistent with the design.

2. Inspecting bracing
   a. 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.

   b. Ensure bracing extends diagonally from the inner or outer posts or runners upward to the next outer or inner posts or runners.
c. Check that building ties are installed at the bearer levels between the transverse bracing and conform to the requirements of 1926.451(c)(1).

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

e. 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.

   o If this technique is used, check that the scaffold is tied at the “k” function level.

f. 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.

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

i. In situations where the attachment of bracing to posts is precluded, the bracing should be attached to the runners.

3. Inspecting bearers

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

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

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

4. Inspecting runners

   a. The scaffold should have runners installed along its entire length and along both the inside and outside posts at the various level heights.

   b. Runners should be interlocked on straight runs to create continuous lengths and be coupled to each post.

   c. Bottom runners should be located as close to the base as possible. Couplers should be made of structural metal.

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

**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.
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.

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.

1. On double pole scaffolds, make sure crossbracing is installed between the inner and outer sets of poles.

2. Make sure diagonal bracing in both directions are installed across the entire outside face of double pole scaffolds used to support loads equivalent to a uniformly distributed load of 50 pounds or more per square foot.

3. On both double and single pole scaffolds, ensure diagonal bracing is installed across the entire outside face.

4. Ensure runners and bearers are installed on the edges (e.g., narrow side on a two-by-four, the edge would be the 2-inch side).
a. Bearers should extend a maximum of 3 inches over the outside edges of runners.

b. Runners should extend over a minimum of two poles and be supported by bearing blocks securely attached to the poles.

c. Braces, bearers and runners cannot be spliced between poles.

d. Where wooden poles are spliced, the ends should be squared and the upper sections should rest squarely on the lower sections.

5. When platforms are being moved to the next level, make sure the existing platforms are left undisturbed until the new bearers have been set in place and braced, prior to receiving the new platforms.

6. Make sure pole scaffolds more than 60 feet in height are designed by a registered professional engineer and constructed and loaded in accordance with that design.

**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.
Module 3 Quiz
Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

1. Tube and coupler scaffolds more than _____ high should be designed by a registered professional engineer.
   a. 10
   b. 25 feet
   c. 125 feet
   d. 100 feet

2. When the length of tube and coupler scaffolds is greater than the height, longitudinal bracing should be repeated at least every _____.
   a. 8th post
   b. 100 feet
   c. 30 feet
   d. 5th post

3. When inspecting mobile scaffolds, make sure that, while in a stationary position, _____ to prevent movement.
   a. baseplates are secured
   b. casters and wheels are locked
   c. the scaffold is tied to a structure
   d. a scaffold watch is posted

4. When manual force is used to move a mobile scaffold, make sure the force is applied _____, but not more than 5 feet above the supporting surface.
   a. as close to the base as practicable
   b. from one side only
   c. with steady pressure
   d. at the first horizontal support
5. What is the maximum number of tiers allowed for Bricklayer's Square type scaffolds?

   a. two
   b. six
   c. three
   d. five
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.

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.

**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 1 1/2 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

**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.

**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 inch.
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.

**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.

**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:

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

**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
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.
Module 4 Quiz
Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

1. When inspecting Roof Bracket Scaffolds, make sure they are secured with _____ when practical.
   a. nails
   b. welds
   c. rope
   d. metal studs

2. When inspecting Outrigger Scaffolds, verify they have been designed by a _____.
   a. competent person
   b. registered professional engineer
   c. qualified person
   d. certified safety professional

3. You are inspecting a Pump Jack Scaffold and notice that it is being braced using wood angles. What should you tell the workers?
   a. The bracing and accessories should be fabricated from parts from Home Depot
   b. The bracing and accessories should be fabricated from 2-inch X 4-inch treated lumber
   c. The bracing and accessories should be fabricated from metal plates and angles
   d. Good job. Continue working, but make sure the bracing does not loosen

4. How many employees are allowed to work on a Window Jack Scaffold at any one time?
   a. 1
   b. 2
   c. 3
   d. 4
5. **What is the maximum height for a Horse Scaffold?**
   
   a. 14 feet or two tiers  
   b. 20 feet or three tiers  
   c. 12 feet or three tiers  
   d. 10 feet or two tiers
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.

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.

**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

This image is a two-point suspension scaffold suspended from outriggers with counterweights. There are no tiebacks. The yellow lifelines should not be attached to outriggers.
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.

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.

**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.

1. Inspect to make sure scaffold outrigger beams are stabilized by:
   a. bolts or other direct connections to the floor or deck
   b. counterweights
2. Make sure direct connections to roofs and floors 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

   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

**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.

**Support Capacity**

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

2. 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:
   a. the rated load of the hoist
   b. 2 times the stall load of the hoist

3. Inspect to ensure all suspension scaffold support devices, such as outrigger beams, cornice hooks, and parapet clamps:
   a. Rest on surfaces capable of supporting at least 4 times the load imposed on them by the scaffold operating at the greater of either:
   b. rated load of the hoist
   c. 1½ times the stall capacity of the hoist

This job-made rig has some decking and ladders hung from the roof. Who determined if the scaffold is capable of supporting its own weight and 4X its maximum intended load?
d. are supported by bearing blocks

e. are secured against movement by tiebacks installed at right angles to the face of the building or structure, or by opposing angle tiebacks installed and secured to a structurally sound point of anchorage (structurally sound points of anchorage include structural members, but not vents, electrical conduit, or standpipes and other piping systems)

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

5. Ensure no more than three employees occupy suspension scaffolds designed for a working load of 750 pounds (non-mandatory).

6. Make sure 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.

Can this parapet support at least 4X the imposed load by the cornice hook? Should the cornice hook be tied back, and supported with bearing blocks?
Support Outrigger Beams

1. Make sure outrigger beams are made of structural metal, or other material of equivalent strength.

2. Ensure outrigger beams are restrained to prevent movement.

3. Check to make sure inboard ends of outrigger beams are stabilized by bolts or other direct connections to the floor or roof deck, or by counterweights.

4. Make sure before the scaffold is used, direct connections of outrigger beams are evaluated by a competent person to determine that the supporting surfaces are capable of bearing the loads that will be imposed on them.

5. If outrigger beams are not stabilized by bolts or other direct connections to the floor or roof deck, make sure they are secured by tiebacks.

6. Ensure outrigger beams are placed perpendicular (90-degree angle) to their bearing support when feasible (usually the face of the building or structure).

7. When perpendicular outrigger placement is not possible because of obstructions that cannot be moved, check to ensure outriggers have been placed at some other acceptable angle, and that opposing angle tiebacks are used.

8. Check to make sure outrigger beams:
   a. have stop bolts or shackles at both ends
   b. are securely fastened together with the flanges turned out when channel iron beams are used instead of I-beams
   c. are installed with all bearing supports perpendicular to the beam center line
   d. are set and maintained with the web in a vertical position
   e. are attached to the scaffold ropes by a shackle or clevis placed directly over the stirrup
Scenario

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.

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

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.

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

10. 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
Scenario

Broken Suspension Ropes Result in Worker Death

Two victims and a co-worker were painting the side of a building in San Francisco. They were on a two-point suspension scaffold that did not have guardrails; the ropes suspending the scaffold were old and had not been inspected; and the employees were not wearing safety belts. When the left scaffold rope broke and the scaffold collapsed, one employee was killed and another fell to a nearby roof and broke both arms. The co-worker was left hanging on to the remaining scaffold rope.

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.
Module 5 Quiz
Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

1. Which of the following is the most common type of suspension scaffold?
   a. Interior Hung Scaffold
   b. One-Point Suspension Scaffold
   c. Two-Point Suspension Scaffold
   d. Needle Beam Scaffold

2. Which of the following components is "the beginning" of the safe use of a suspended scaffold?
   a. A certified platform
   b. A secure anchorage
   c. Proper fall protection
   d. Weather conditions

3. Which of the following scaffolds is designed to be raised and lowered while occupied by workers and materials?
   a. Adjustable suspension scaffold
   b. Adjustable supported scaffold
   c. Masonry workers' scaffold
   d. Horse scaffold

4. While inspecting work being conducted on an adjustable suspension scaffold, you notice that repaired wire rope is being used. What do you tell the workers?
   a. Look for corrosion and splicing defects
   b. Check the wire rope after each day
   c. Be sure to replace the wire rope when work is finished
   d. The use of repaired wire rope is prohibited
5. When inspecting hoists, verify that power-operated and manual hoists have been tested and listed by _____.
   a. a competent person
   b. a competent person
   c. a qualified testing laboratory
   d. UL, OSHA or NIOSH
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.

Inspecting Boatswain’s Chairs
A Boatswains’ 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)

**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

3. 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.
4. Look to determine if wire ropes are not over-tightened to the point that a scaffold load will overstress them.

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

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

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

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

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

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

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

**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.

**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).

**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
   c. leaves enough rope for supporting ties

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.
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.

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.
Module 6 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

1. Which of the following is the most common scaffold used by window washers to clean the outside of a building?
   a. Single-Point Adjustable Scaffold
   b. Two-Point Swing Stage
   c. Multiple-Point Adjustable Scaffold
   d. Variable-Point Adjustable Scaffold

2. Check the wood seats for boatswain’s chairs to make sure they are no less than ______ (if made of marine-quality plywood).
   a. 1 inch thick
   b. 1/2-inch thick
   c. 5/8-inch thick
   d. 2 inches thick

3. Which of the following scaffolds has a series of platforms at various levels supported by common stirrups?
   a. One-Point Level Suspension Scaffold
   b. Multi-Level Suspension Scaffold
   c. Multi-Point Supported Scaffold
   d. Multiple-Point Adjustable Suspension Scaffold

4. When inspecting Interior Hung Scaffolds, verify the _____ have/has been inspected for strength before scaffolds are erected.
   a. base plates
   b. crossbracing
   c. posts
   d. roof structure
5. When inspecting Needle Beam Scaffolds, verify support connections are arranged to prevent the needle beam from _____.

a. sinking or dislodging
b. rolling or becoming displaced
c. breaking or twisting
d. warping or moving
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