Scaffold User Safety

FN000681/CR/01

Agenda

- Overview
- Scaffold Types
- Terminology
- Hazards associated with scaffold use
- Proper use
- Your responsibilities

Scaffolding Definition

Scaffolding means any temporary elevated platform (supported or suspended) and its supporting structure (including points of anchorage), used for supporting employees or materials or both.

Scaffold Injury Prevention

- 4500 injuries annually associated with scaffoldings
- 50 deaths annually
- Over $90 million lost workday costs

Major Points

- Fall protection
  - 10 foot trigger height for fall protection on scaffolds
    - Compared to 6 foot trigger for Construction and 4 foot trigger for General Industry
  - 38 inch – 45 inch guardrail height, midrails installed halfway between the toprail and platform surface
- Crossbracing – when used as a toprail, must be between 38 inches and 48 inches above the work platform
- Platforms – must be fully planked or decked
- Guying ties and braces – supported scaffolds that have a height to base greater than 4:1 must be restrained from tipping by guying, tying, bracing, or equivalent
- Footings – shall be level and capable of supporting the loaded scaffold. The legs, poles, frames, and uprights must be on base plates and mudsills
- Capacity – the scaffold and scaffold components must support at least 4 times the maximum intended load. Suspended scaffold rigging must support at least 6 times the maximum intended load
- Inspections – required before each work shift (or after any occurrence that could affect the structural integrity) by a competent person for visible defects

Key elements of scaffold safety

Capacity

Fall protection

- Guardrails
- Fall arrest systems

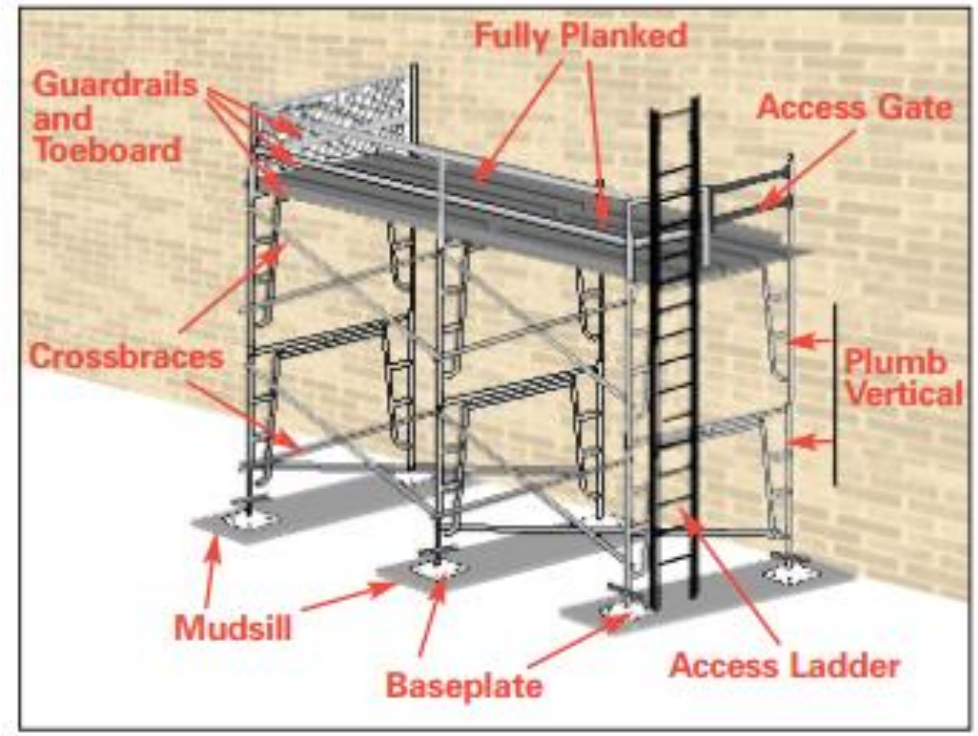
Crossbracing, midrails, footings

Platforms, guying ties

Training

Inspections

Erecting and dismantling



Competent Person Definition

An **OSHA** "**competent person**" is **defined** as "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them" [29 CFR 1926.32(f)].

Competent Person Responsibilities

- Select, direct and oversee employees who erect, dismantle, move, or alter scaffolds
- Determine feasibility of providing fall protection and access for erectors/dismantlers
- Train erectors/dismantlers to recognize associated work hazards
- Evaluate connections to support load and prevent swaying
- Determine structural soundness when intermixing components from other manufacturers
- Brief users on specific hazards of scaffold
- Inspect scaffolding and components prior to **each** work shift, and after any alterations or changes have been made

Qualified Person Definition

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

Qualified Person Responsibilities

- The qualified person has specific duties under the scaffolding standard, including:
  - To design and load scaffolds in accordance with that design.
  - To train employees working on the scaffolds to recognize the associated hazards and understand procedures to control or minimize those hazards.
  - To design the rigging for single-point adjustable suspension scaffolds, and
  - To design platforms on two-point adjustable suspension types that are less than 36 inches wide to prevent instability.

Scaffold Erector

Is defined as a person who is responsible for the erection and disassembly of scaffolding.

Scaffold Erector Responsibilities

- Receive scaffold user training, hands-on scaffold erector training and assemble/work on scaffolds accordingly.
- Read and comply with the Fermilab Ladder & Scaffold Safety Chapter.
- Abide by all manufacturer recommendations.
- Placement of scaffold in vicinity of exposed or outside overhead electrical power is not permitted without proper LOTO.
- Inspect all scaffold components prior to assembly to ensure that components used are of similar material and in good condition before becoming part of the completed scaffold.
- Maintaining fall protection requirements while erecting/dismantling scaffolds.
- Prior to occupation, scaffold erectors must notify the competent person that the scaffold has been erected and is ready to be inspected.
- Notify the Competent Person, supervisor or DSO if there is a concern regarding the erection of the scaffold.

Scaffold User

Defined as a person who utilizes a scaffold to perform work

Scaffold User Responsibilities

- Receive scaffold user training and work on scaffolds accordingly.
- Read and comply with the Fermilab Ladder & Scaffold Safety Chapter.
- Examine the scaffold tag (which should be affixed near the access point) to verify that a Competent Person has deemed the scaffold safe for use. This must be done prior to initial use of the scaffold each shift.
- Notify the Competent Person, supervisor or DSO of any deficiencies or unsafe conditions noted during inspection or use of scaffolds.
- Do not attempt to alter or repair any scaffold without proper training and authorization.
- Keep scaffold area clean and clear of debris & unnecessary tools, material, and equipment.
- Follow the work practices described in this training, including the use of appropriate protective equipment and conducting pre-use inspections.

Types of Scaffolds

25 types of scaffolds in use, most common types include:

- Fabricated, welded or support frame
- System scaffolds

Pole scaffold	Fabricated frame scaffold	Plasterer, decorators, or large area scaffold	Bricklayers square scaffold	Multi-level suspension scaffold
Horse scaffold	Form scaffold, Carpenter's bracket scaffold	Roof bracket scaffold	Outrigger scaffold	Mobile scaffold
Pump jack scaffold	Window jack scaffold	Crawling boards (chicken ladders)	Step, platform, trestle ladder scaffold	Repair bracket scaffold
Single-point adjustable suspension scaffold	Two-point adjustable suspension scaffold	Stone setters multi-point adjustable suspension scaffold	Masons multi-point adjustable suspension scaffold	Tank builders scaffold
Catenary scaffold	Float (ship) scaffold	Interior hung scaffold	Needle beam scaffold	Stilts

Capacity

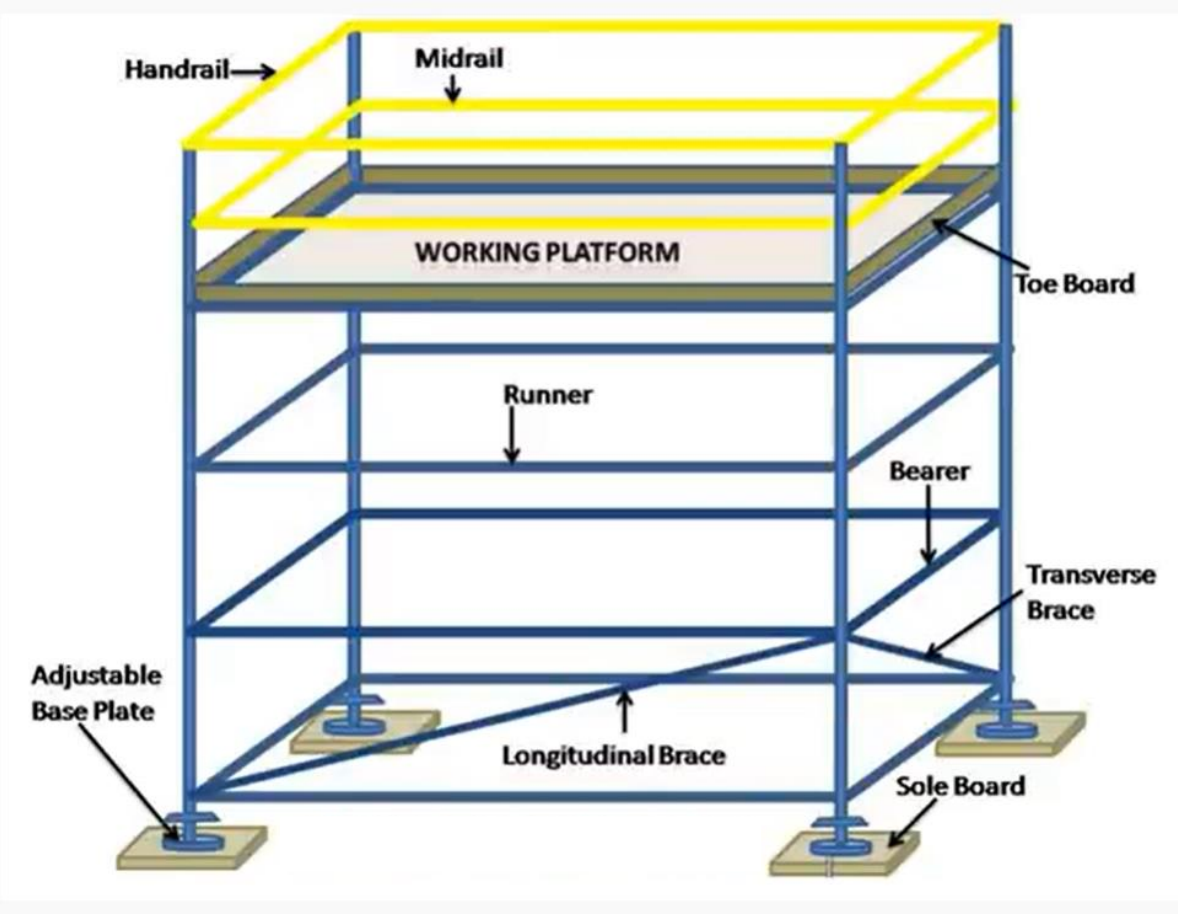
Non-Adjustable

- Support its own weight and 4 x maximum intended load
- Suspension rope and connecting hardware support 6 x maximum intended load

Adjustable

- Stall load of scaffold hoist not to exceed 3 x rated load
- Designed by a qualified person and built to loaded design

Scaffold Components



Platform Construction

Fully planked and decked

- No more than 1” gap between adjacent units and platform and uprights
- Max openings between platform and uprights 9 -1/2”
- Platform and walkways at least 18” wide

Platform Construction

Each abutted end shall rest on a separate support surface

Overlap platforms not be less than 12” only over supports unless restrained to prevent movement

On direction changes, platforms that rests on a bearer at an angle other than a right angle must be laid first

Platforms that rest at right angles over the same bearer laid second

Platform Construction

Front edge of all platforms

- No more than 14” from face of work
- 3” from face for outrigger scaffolds
- 18” from face for plastering and lathing operations

Platforms 10’ and less to extend at least 6” but not more than 12” past support

Platforms greater than 10’ nor more than 18” past support unless

Platform Construction

Fully planked and decked

- Ladder jack, top plate bracket, roof bracket, and pump jack scaffold at least 12” wide
- Guardrails and/or personal fall arrest systems for platforms and runways not 18’ wide

Platform Construction

No paint on wood platforms, except edges that may be marked for identification

Fully planked between from upright and guardrail

No mixed components, unless compatible and integrity maintained

No modification of mixed components unless approved by competent person

No components or dissimilar metals unless competent person determines galvanic action will not reduce strength

Supported Scaffolds

Restrained from tipping by guys, ties, or equivalent when higher than 4:1 ratio

Support installed per recommendations or at closest horizontal member to the 4:1 height

Supported Scaffolds

Must bear on adequate foundations

Unstable objects will not be used as working platforms

Plumbed and braced

Suspension Scaffolds

Support devices must support 4 times the imposed load

Outrigger beams, metal or equivalent material, and restrained

Outrigger beams stabilized to floor or roof deck

Direct connection evaluated by competent person

Suspension Scaffolds

Counterweights made of non-flowable material, (not sand, gravel, etc.)

Counterweights secured, and not removed until scaffold disassembled

Tiebacks secured to sound anchorage on the building or structure

Single tiebacks installed at angle are prohibited

Suspension Scaffolds

Minimum lengths for suspension ropes on hoists

No repaired wire rope

Proper sized eye splice thimbles

Ropes Inspected by competent person

No swaged attachment unless approved

Suspension Scaffolds

No gasoline powered equipment or hoist

Automatic brakes on powered and manual hoists

Positive crank forces to descend

Tied to prevent swaying

Safety devices not used as platforms

Access

Must have safe access to all scaffolding

Climbing cross-braces as means of access is prohibited

Bottom rung no more than 24” high

Slip-resistant treads on all steps and landings

Access

Hook-on attachable ladders

Specifically designed for type of scaffold

Lowest rung no more than 24 inches above level on which scaffold is supported

Rest platforms at 35 foot intervals when more than 35 feet high.

Minimum rung length 11 ½ inches, and maximum space between rungs 16 ¾ inches

Use

Never overload

Keep 10-foot minimum distance from overhead power lines unless de-energized, relocated, or protective covering installed

Do not use in high winds, or adverse weather

Never use a scaffold covered in snow or ice

Use

Never use barrels, boxes, ladders, or other elevating devices on top of scaffolds

Always keep the working platform clear of debris and unnecessary equipment, tools, and material.

Fall Protection

Required at 10’

- Guardrails
- Personal fall arrest system

Both Personal Fall Arrest System *and* guardrails are required on suspension scaffolds

Electrical Hazards – Power Lines

If setting up your scaffold in the vicinity of energized electrical lines, you must either deenergize the lines, or keep a minimum distance of 10 feet (3.1 meters)

Insulated Lines Voltage	Minimum	Alternatives
Less than 300 volts	3 feet (0.9 meters)	
300 volts to 50 kv	10 feet (3.1 meters)	
More than 50 kv	10 feet (3.1 meters) plus 0.4 inches (1 cm) for each 1 kv over 50 kv	

Uninsulated Lines Voltage	Minimum	Alternatives
Less than 50 kv	10 feet (3.1 meters)	
More than 50 kv	10 feet (3.1 meters) plus 0.4 inches (1 cm) for each 1 kv over 50 kv	

Electrical Hazards – Portable Electric Tools

Because metal frame scaffolds are conductive, power tools, cords, etc. that suffer from insulation failure can electrify the entire scaffold. This poses a risk of electrocution to anyone who contacts the scaffold. All portable electric equipment must be protected by GFCI (ground-fault circuit interrupters).

Falling Object Protection

Hardhats required for users of scaffold and workers near scaffold

Protect personnel below from falling objects

- Toe-boards – must be installed along the edge of platforms more than 10 feet above lower levels, must be at least 3.5 inches high and securely fastened in place
- Screens – where tools, materials or equipment are piled to a height higher than the top edge of the toeboard, they should be prevented from falling by paneling or screening extending from the toeboard to the top of the guardrail
- Canopies/Debris net – must be strong enough to withstand the impact of the potential falling objects
- Barricades – barricade area below the scaffold so personnel may not enter

Scaffold Inspections

The competent person is responsible for inspecting the scaffold prior to each work shift. Look for the inspection tag before using the scaffold to ensure it has been inspected that day. If not, contact the competent person or your supervisor and do not use the scaffold until it has been inspected and approved for use.

Supported Scaffolds

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

Pole/Wood Pole

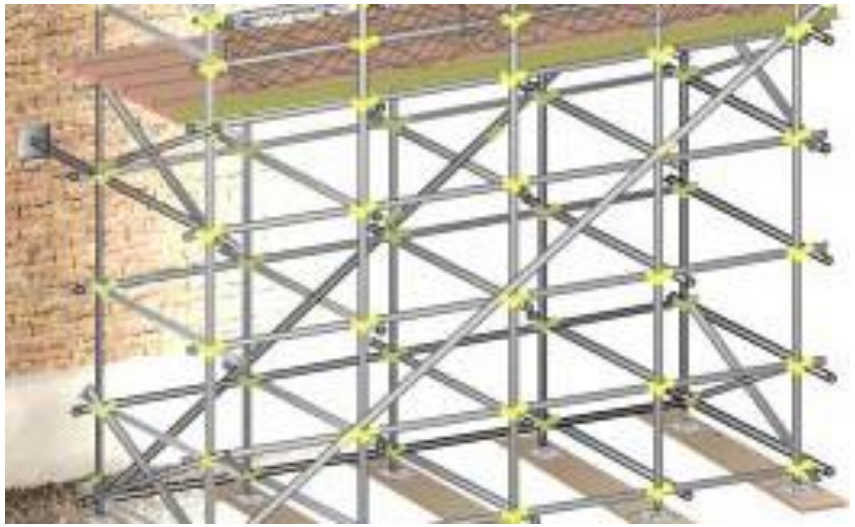
Restrict movement of existing platform until bearers are set, and braced

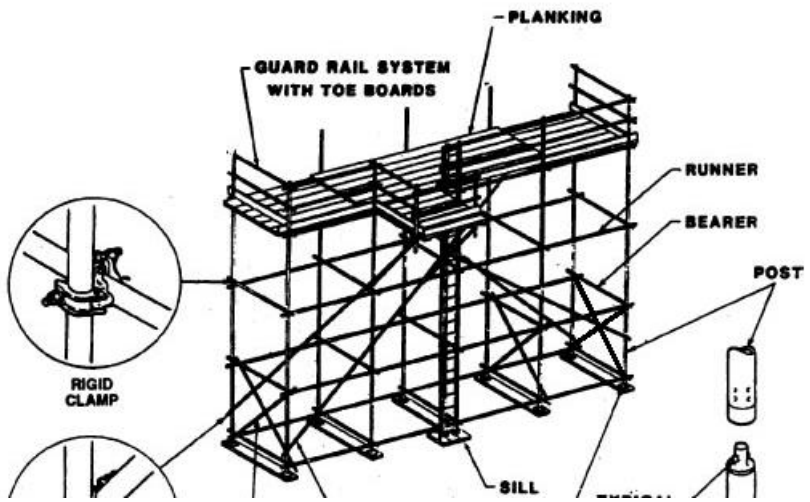
Couplers have to be made of structural steel

- The use of couplers made from gray cast iron is prohibited

Designed by P.E. when more than 60 feet in height, constructed and loaded in accordance with that design

Diagonal bracing must be installed in both directions across the entire outside face of double and single-pole scaffolds, and the entire inside face of double-pole scaffolds used to support loads of 50 pounds or more per square foot





Tube and Coupler

When platforms are being moved to the next level, the existing platform must be left undisturbed until the new bearers have been braced and set in place

Couplers must be made of a structural metal

- Couplers made from gray cast iron are prohibited

Designed by P.E. if over 125 feet in height

Tube and Coupler

Transverse bracing forming an "X" across the width of the scaffold must be installed at the scaffold ends, and at least at:

- Every third set of posts horizontally (measured from only one end)
- Every fourth runner vertically

Bracing must extend upward diagonally to opposite sides of the scaffold

Building ties must be installed at the bearer levels between transverse bracing

On scaffolds where length is *greater* than their height, longitudinal bracing must be repeated beginning at least at every fifth post

Bearers must be installed transversely between posts

Runners must be installed along the length of the scaffold, located at level heights on both the inside and outside posts

On outside posts, tube and coupler guardrails and midrails may be used in lieu of outside runners

Runners on straight runs must be interlocked to form continuous lengths, and coupled to each post

Fabricated frame

Existing platforms remain until the frames are set / braced

- Joined with stack pin

Must be designed by professional engineer (PE) when over 125 ft.

Mobile

Plumb, level and squared

Braced to prevent collapse

Casters and wheels locked to prevent movement while working

Platforms must not extend beyond the base supports of the scaffold, unless stability is ensured

Personnel may not ride on scaffolds when they are being moved.

Pump jack

Brackets, braces must be fabricated from metal plates and angles

Each bracket must have two positive gripping mechanisms

Workbench may be used as a top-rail when guardrails used for fall protection

Work benches must not be used as scaffold platforms

Poles must be secured to structure by rigid triangular bracing, or equivalent

Maximum intended load for pump jack scaffolds is 500 pounds

No more than two workers may be on a pump jack scaffold between any two supports at one time

Ladder jack

All ladders used to support the scaffold must meet requirements of subpart X - stairways and ladders

- Exception: Job-made ladders must not be used to support ladder jack scaffolds

Ladder jacks must be designed and constructed to bear on:

- Side rails and ladder rungs, or
- Ladder rungs alone
  - If bearing on ladder rungs alone, the bearing area must include a length of at least 10 inches on each rung

Ladders used to support ladder jack scaffolds must be:

- Placed and fastened to prevent slipping

Platforms should not be placed higher than 20 feet from the supported base, platforms must not be bridged together

Ladder jack scaffolds have a maximum intended load of 25 pounds per square foot

Not more than two employees may occupy any platform at one time

The maximum span between supports is 8 feet

Suspended scaffolds

Suspended scaffolds are platforms suspended by ropes, or other non-rigid means, from an overhead structure

Two-point swing stage

Platform limited to 36”

Platform securely fastened to hangars

Platforms must be of ladder, plank or beam type

Must not be bridged together unless bridge and hoist is appropriately sized

Single-point adjustable

Supporting rope between scaffold and the suspension device must be kept vertical unless:

- Rigging has been designed by a qualified person
- Scaffold is accessible to rescuers
- Support rope is protected from rubbing during direction changes, and
- Scaffold is positioned so swinging cannot bring it into contact with other surfaces

Multi-level

Must be equipped with additional independent support lines that are:

- Equal in number to number of points supported
- Equal in strength to the suspension ropes
- Rigged to support scaffold if the suspension ropes fail

Independent support lines and suspension ropes must not be anchored to the same points

Supports for platforms must be attached directly to support stirrups (not to other platforms)

Summary

Do:

- Make sure the scaffold has been inspected prior to using it and each day you use it
- Wear your PPE (hard hat at a minimum)
- Know the weight capacity of the scaffold
- Keep both feet on the platform

Don’t:

- Leave materials on the scaffold at the end of your shift
- Overload the scaffold
- Use objects to increase your work height
- Use the scaffold if guardrails or flooring are missing
- Stand on the guardrails
- Use the scaffold if it appears damaged in any way, or if components may be missing
- Throw anything “overboard”

Questions?