



Scaffolding

Risk Management and Safety
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Topics of Discussion



- Awareness
- Types of Scaffolding
- Scaffolding Basics
- Erecting Scaffolds
- Inspection of Scaffolds
- Do's and Don'ts



Scaffolding Accident/Injury Statistics

- An estimated 2.3 million construction workers, or 65% of the construction industry, work on scaffolds frequently.
- Protecting these workers from scaffold-related accidents would prevent 4,500 injuries and 50 deaths per year.



Scaffolding Accident/Injury Statistics

Rank	States	Amount
# 1	Florida:	75
# 2	California:	71
# 3	Texas:	61
# 4	Georgia:	51
# 5	New York:	49
# 6	Pennsylvania:	34
# 7	New Jersey:	33
# 8	Illinois:	29
# 9	Tennessee:	27
# 9	Virginia:	27
# 11	Ohio:	24
# 12	North Carolina:	22
# 12	Indiana:	22
# 14	Alabama:	16
# 14	Connecticut:	16
# 16	Washington:	15
# 16	Michigan:	15
# 18	Nevada:	14
# 18	Iowa:	14
# 18	Wisconsin:	14

Rank	States	Amount
# 21	Massachusetts:	13
# 22	Mississippi:	12
# 23	Minnesota:	11
# 23	Arizona:	11
# 23	Louisiana:	11
# 23	Kentucky:	11
# 23	Maryland:	11
# 28	Arkansas:	10
# 28	Kansas:	10
# 28	Missouri:	10
# 28	Oklahoma:	10
# 32	South Carolina:	9
# 32	Colorado:	9
# 32	Nebraska:	9
# 35	Oregon:	7
# 36	Utah:	6
# 37	District of Columbia:	4
# 37	Montana:	4
# 37	South Dakota:	4
# 40	New Hampshire:	3
# 40	Wyoming:	3



Hazards

Employees working on scaffolds are exposed to these hazards:

- **Falls from elevation** – caused by slipping, unsafe access, and the lack of fall protection
- **Struck by** falling tools / debris
- **Electrocution** – from overhead power lines
- **Scaffold collapse** - caused by instability or overloading
- **Bad planking** giving way



Registered Professional Engineer

A registered professional engineer must design and certify scaffolds:

- with wood poles and over 60 feet in height
- frame scaffolds over 125 feet in height
- outrigger scaffolds plus scaffold erections
- when intended loads exceed tube and coupler scaffold standard ratings



Competent Person

A competent person is a person on the project who has knowledge to identify and the authority to correct site hazards.

Scaffold Builders usually work at height. They can fall and get seriously injured or even killed. They may suffer injuries from falling bodies, and from work with hand tools. Examples of other hazards include electric shock, exposure to the weather (including lightning), and injuries or ergonomic hazards caused by lifting and transporting heavy weights.



Competent Person Duties

Scaffolds have to be inspected daily by a competent person.

Scaffolds must be erected, moved, dismantled or altered under the supervision of a competent person.

Work by qualified workers selected by the competent person.

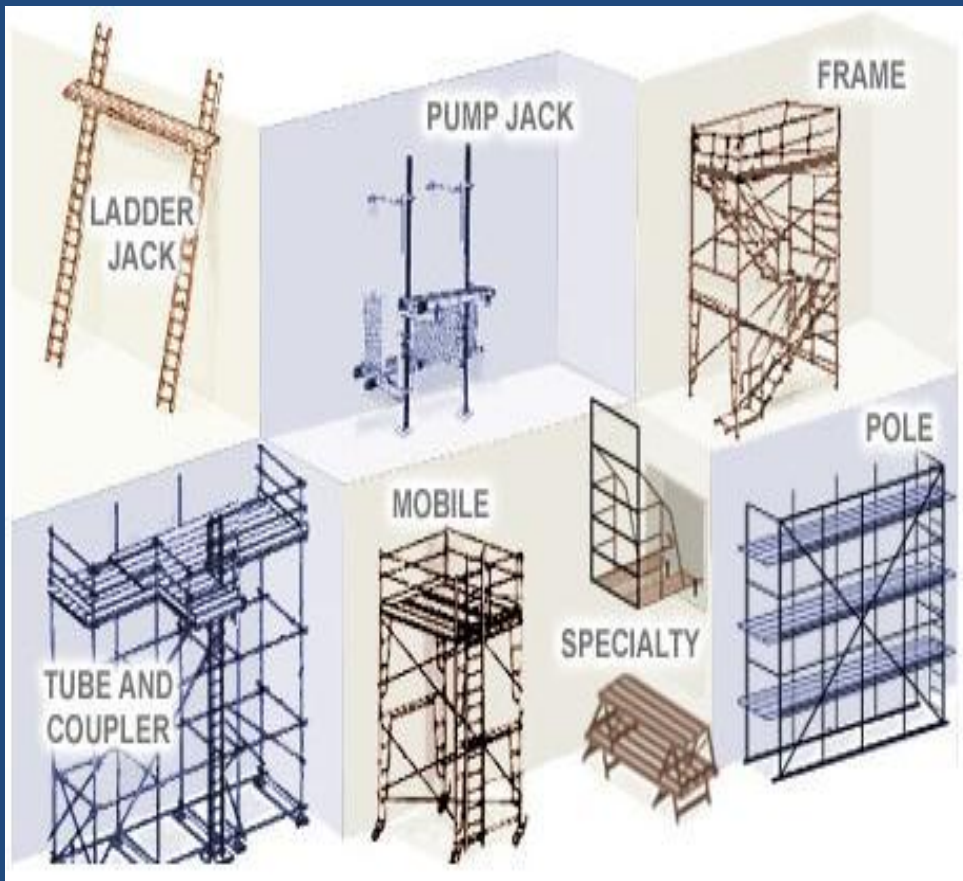


Types of Scaffolds

- Suspended scaffolds
- Supported scaffolds
- Specialty (other) scaffolds



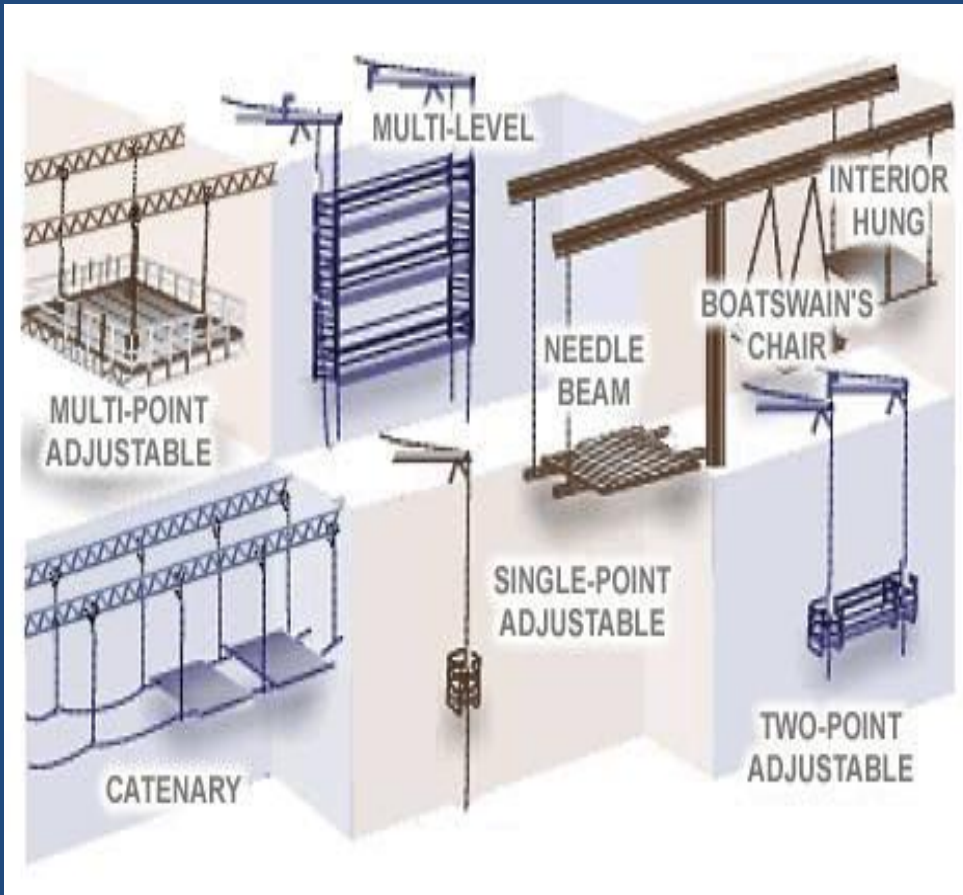
Supported Scaffolds



- Ladder Jack
- Pump Jack
- Frame or Fabricated
- Tube and Coupler
- Mobile
- Specialty
- Pole



Suspended Scaffolds



- Two-Point
- Single-Point Adjustable
- Catenary
- Multi-point Adjustable
- Interior Hung
- Needle Beam
- Multi-Level
- Float (ship)



Specialty Scaffolds



- Plasterers';
- Decorators', and other large-area scaffolds;
- Bricklayers' square scaffolds;
- Horse scaffolds;
- Outrigger scaffolds;
- Step, platform, and trestle ladder scaffolds;
- Form and carpenter's bracket scaffolds;
- Window jack scaffolds;
- Crawling boards and chicken ladders; and
- Roof bracket scaffolds.



Fundamentals



- **Training** — Employers must train each employee who works on a scaffold on the procedures to control or minimize the hazards.
- **Inspections** — Before each work shift and after any occurrence that could affect the structural integrity, a competent person must inspect the scaffold and scaffold components for visible defects.



Fall Protection



Fall protection (e.g. guardrails) required at a 6 foot height above a lower level.

Rail system design:

- Top rail installed between 38 and 45 inches
- mid rail between top rail and working surface

Finished components must with stand:

- A force 200 pounds for top rail
- 150 pounds for mid rail



Fall Protection

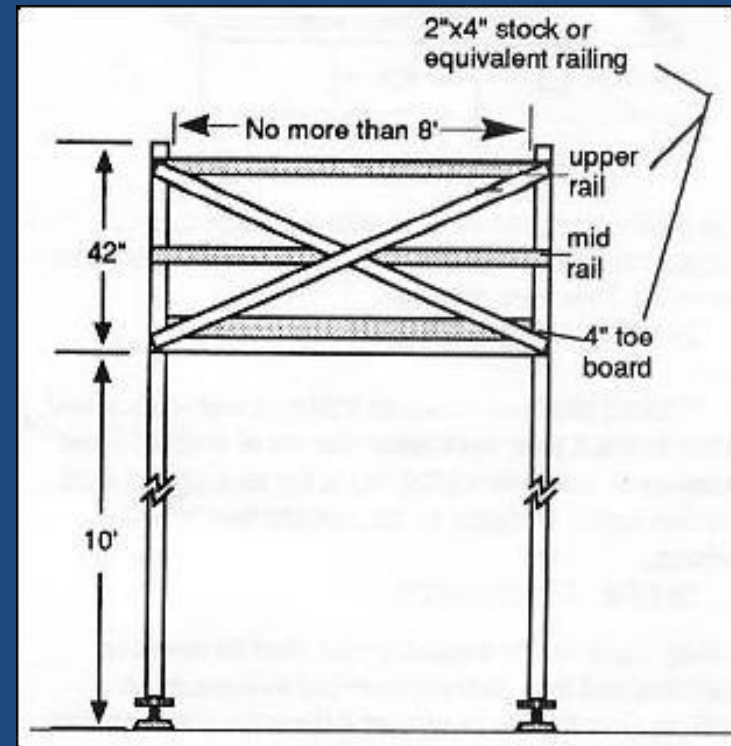
Guardrails must be free of sharp edges.

Ends of rails must be constructed so it does overhang the terminal posts

Steel or plastic bands are not acceptable as railing

Cross brace may be used as a mid rail if it meets the height requirement (cross between 20-30 inches)

Toe boards- withstand 50 pounds of force and be 3.5 inches wide.



Access

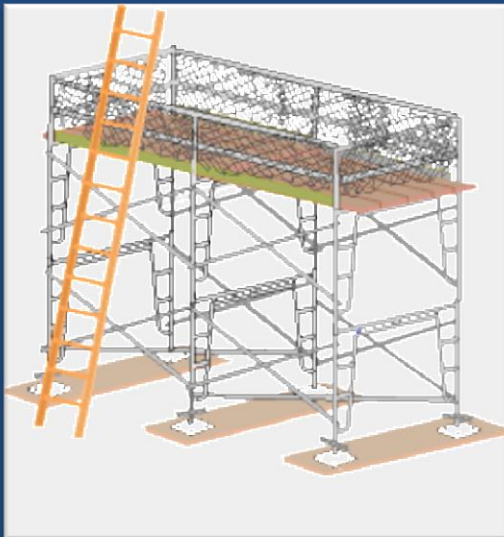
When erecting, using, and dismantling supported scaffolds, a competent person must determine the feasibility of providing a safe means of access and fall protection for these operations.



Access

Portable, hook-on, and attachable ladders must be positioned so as not to tip the scaffold.

Hook-on and attachable ladders must be specifically designed for use with the type of scaffold on which they are used.



Hook-on and attachable ladder rungs shall:

- Be positioned so that their bottom rung is not more than 24 inches above the scaffold supporting level.
- Have uniform spacing between rungs of a maximum $16\frac{3}{4}$ inches.
- Have minimum rung length of $11\frac{1}{2}$ inches.
- Have rest platforms provided at a maximum of 35-foot vertical intervals.



Access

Stairway-type ladders shall:

- Be positioned so that their bottom step is not more than 24 inches above the scaffold supporting level.
- Have rest platforms at maximum vertical intervals of 12 feet.
- Have a minimum step width of 16 inches, except for mobile scaffold stairway-type ladders, which shall have a minimum step width of 11½ inches .
- Have slip-resistant treads on all steps and landings.

Steps and rungs of ladders and stairway-type ladders shall line up vertically with each other between rest platforms.



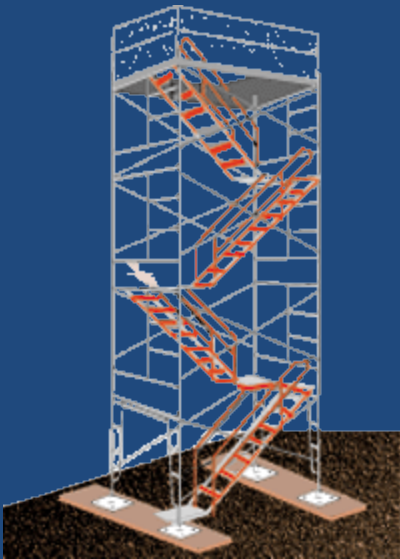
Access

Integral (built-in) scaffold access frames must:

- Be specifically designed and constructed for use as ladder rungs.
- Not be used as work platforms when rungs are less than $11\frac{1}{2}$ inches in length, unless each affected employee uses appropriate fall protection.
- Have rungs which are uniformly spaced and a length of at least 8 inches, with a maximum space between rungs of $16\frac{3}{4}$ inches.
- Have rest platforms provided at a maximum of 35 foot vertical intervals.



Access



Stair towers (scaffold stairway/towers) must have:

- A stair rail consisting of a toprail and a midrail.
- A toprail of each stair rail system capable of serving as a handrail, unless a separate handrail is provided.
- Sufficient handhold on handrails, and toprails serving as handrails, for employees grasping them to avoid falling.
- Stair rails and handrails surfaced to prevent punctures or lacerations to employees, and to prevent snagging of clothing.



Access

- Stair rails and handrails surfaced to prevent punctures or lacerations to employees, and to prevent snagging of clothing.
- Ends of stair rails and handrails constructed so that they do not constitute a projection hazard.
- A space of at least 3 inches between handrails, or stair rails used as handrails, and other objects.
- 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.
- A landing platform at least 18 inches wide by 18 inches long at each level.
- A scaffold stairway width of at least 18 inches between stair rails.
- Slip-resistant surfaces on treads and landings.
- Stairways installed between 40 degrees and 60 degrees from the horizontal.
- Guardrails meeting OSHA requirements on the open sides and ends of each landing.
- Uniform riser height, within ¼-inch, for each flight of stairs. Greater variations in riser height are allowed for the top and bottom steps of the entire system (not for each flight of stairs).
- Uniform tread depth, within ¼-inch, for each flight of stairs.



Access

Ramps and walkways 6 feet or more above lower levels must have guardrails that comply with CFR 1926 Subpart M - Fall Protection.

No ramp or walkway shall incline more than 1:3 (1 vertical to 3 horizontal, or 20 degrees above the horizontal).

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

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.



Access



- Face the rungs
- Use both hands
- Do not carry materials while you climb
- Keep one hand firmly on frame or ladder at all times
- Rungs and shoes should be clean to avoid slipping



Platform

All working levels of scaffolds are required to be fully decked.

Each scaffold platform shall be at least 48 inches wide.

- Ladder jack, roof bracket and pump jack can be 12 inches wide.

Components (different) shall not be mixed unless they fit (integrity maintained).

No gaps greater than one inch allowed

Have sufficient strength to support four times its intended load.

Be made of scaffold-grade lumber with no cracks. Fabricated planks and platforms may be used in lieu of solid sawn wood planks. Maximum spans for such units shall be as recommended by the manufacturer based on the maximum intended load

Planking must be at least 18 inches wide

The front edge shall not be more than 14 inches from face (if in excess rails required).

The end of each platform will extend over the center line by six inches (unless hooked).

Have no opaque finish on the planks.



Platform

Guardrails and toeboards must be put on all open sides and ends of scaffolds 10' or higher



Erection

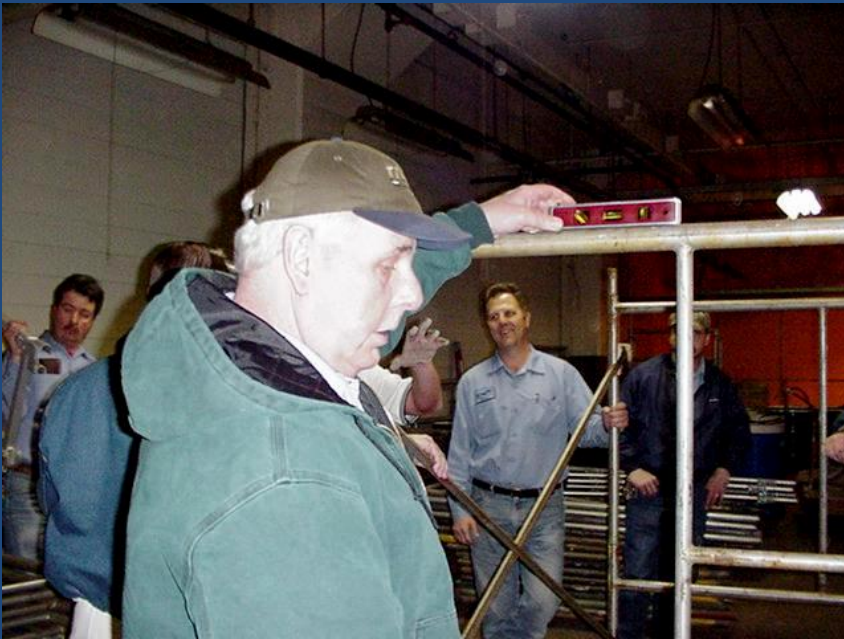
All equipment must be inspected to see that it is in good condition and serviceable.

Damaged or deteriorated equipment must not be used



Erection

Erect plumb, square and rigid with all brace connections securely fastened



Erection



Be sure scaffold stays plumb and level as erection progresses

For mobile scaffolds, use a horizontal diagonal brace, for stability, at the base and every 21 feet in height.



Capacity

Each scaffold and scaffold component must be capable of supporting four times the intended weight.



Planking on this platform should be six planks wide, instead of only two. Also, note that the planks are bowing because the bricks are loaded at one point on the platform instead of being evenly distributed.



Check the Jobsite



Inspect job site to determine ground conditions, strength of supporting structure, proximity to electric lines & overhead obstructions

Compensate for uneven ground by using screw jacks & base plates

Do not use unstable objects such as blocks, loose bricks and similar objects



Check the Jobsite

Minimum Clearances From Electrical Lines

Insulated Lines

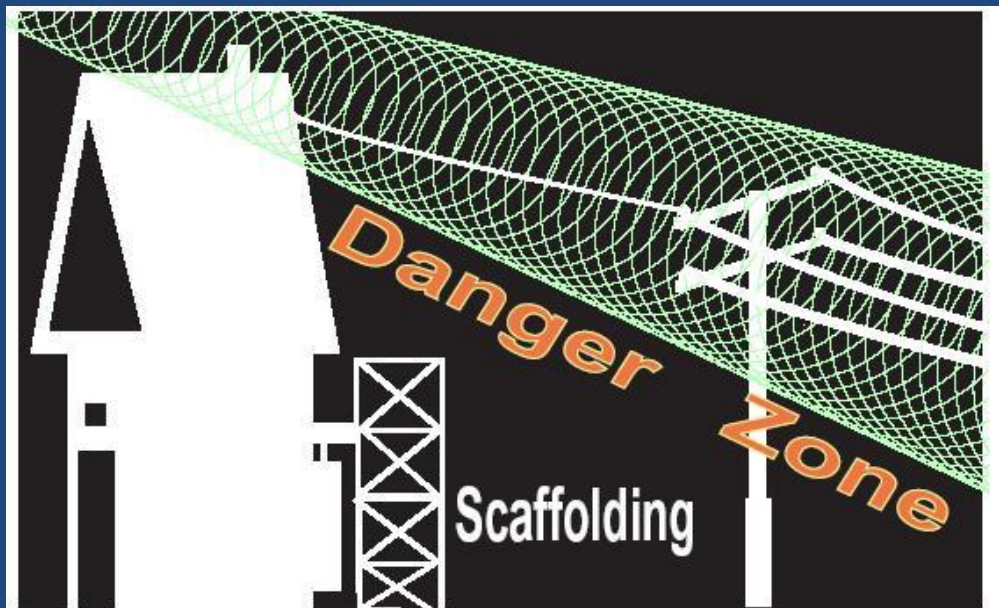
Less than 300 volts	3 feet
300 volts to 50 kv	10 feet
More than 50 kv	10 feet plus 4" for each additional kv

Uninsulated Lines

Up to 50 kv	10 feet
More than 50 kv	10 feet plus 4" for each additional kv



Check the Jobsite



All work must be undertaken outside the "danger zone".

