

CRAWLER® SCAFFOLDS

INSTALLATION & OPERATING MANUAL

**READ THE COMPLETE INSTALLATION
INSTRUCTIONS BEFORE BEGINNING**



CRAWLER PRODUCTS
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CRAWLER®
RUGGED • SAFE • EFFICIENT

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CRAWLER® SCAFFOLD SAFETY LABELS



READ AND UNDERSTAND ALL WARNING LABELS BEFORE USE!



DANGER

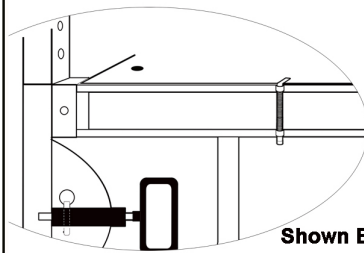


METAL CONDUCTS ELECTRICITY! DO NOT USE WHERE EQUIPMENT OR USER MAY CONTACT POWER LINES OR OTHER LIVE ELECTRICAL CIRCUITS.

ELECTRICAL DANGER



WARNING



Shown Engaged

ALWAYS ENGAGE PLYWOOD HOLD DOWN CLIPS WHEN WORKING ON PLATFORM.

PLATFORM HOLD DOWN CLIP

CRAWLER® SCAFFOLDS
Patent Pending
COPY RIGHT 2006

WARNING Check to be sure the pull pin is fully engaged into the frame leg and the safety pin or a padlock is inserted through pull pin.

PULL PIN

UNLOCK

SAFETY PIN

LOCK

PADLOCK

PADLOCK

PULL PIN INSTRUCTIONS

CRAWLER® SCAFFOLD SAFETY LABELS



READ AND UNDERSTAND ALL WARNING LABELS BEFORE USE!



WARNING

- Ask your supervisor for copies of codes and regulations.
- Be sure you understand how to safely set up and use this scaffold.
- NEVER push or pull scaffold from the work platform.
- Review safety guidelines with your supervisor before using this scaffold.
- DO NOT use equipment that has been damaged, altered or shows signs of deterioration.
- ALWAYS inspect scaffold each day and before use.
- MAXIMUM free standing platform height should never exceed 3 times the smallest base dimension (Check local & state codes)
- Casters must be locked and pinned to the scaffold leg before using.
- NEVER ride a rolling scaffold without an approved scaffold moving device attached.
- Guard rails and toeboards MUST be used at all work platforms over 10' high.
- NEVER use other objects such as ladders, boxes, ect. to increase the working height.

IN ADDITION TO THE ABOVE FOLLOW ALL FEDERAL, OSHA, STATE AND LOCAL CODES AND REGULATIONS FOR THE PROPER USE OF THIS EQUIPMENT.

GENERAL SAFETY INSTRUCTIONS

INSIDE



WARNING

Guard rail must be installed so the gate swings to the inside.

Make sure gate is closed and locked at all times.

Guard rails are required by OSHA on all platforms 10' or higher.

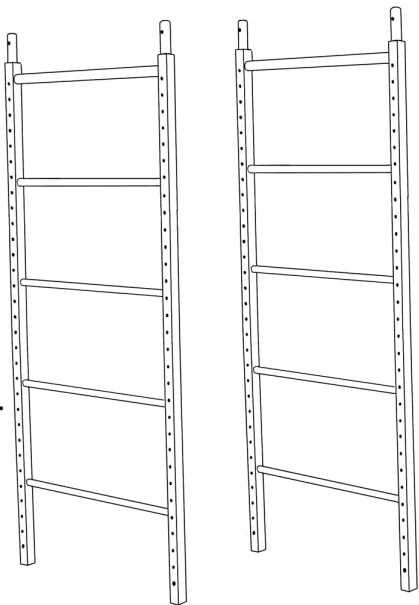
Check state, local and jobsite regulations for variance from federal OSHA scaffold standards.

GUARD RAIL INSTRUCTIONS

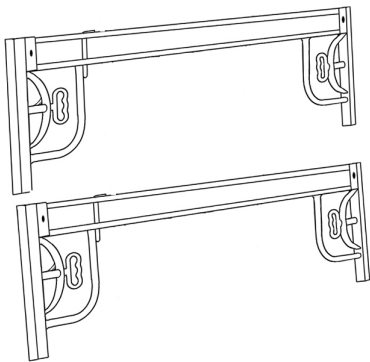
CRAWLER® SCAFFOLD INVENTORY AND PARTS

IMPORTANT

Check to make certain all parts are present and take the time to become familiar with the part and it's proper name. This will help with the assembly of the scaffold.



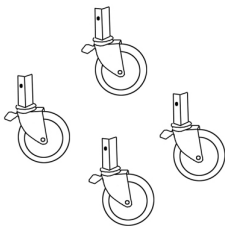
QUANTITY	ITEM
2	End frames “A”



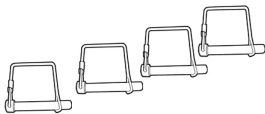
2	Trusses “B”
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1	Platform “D”
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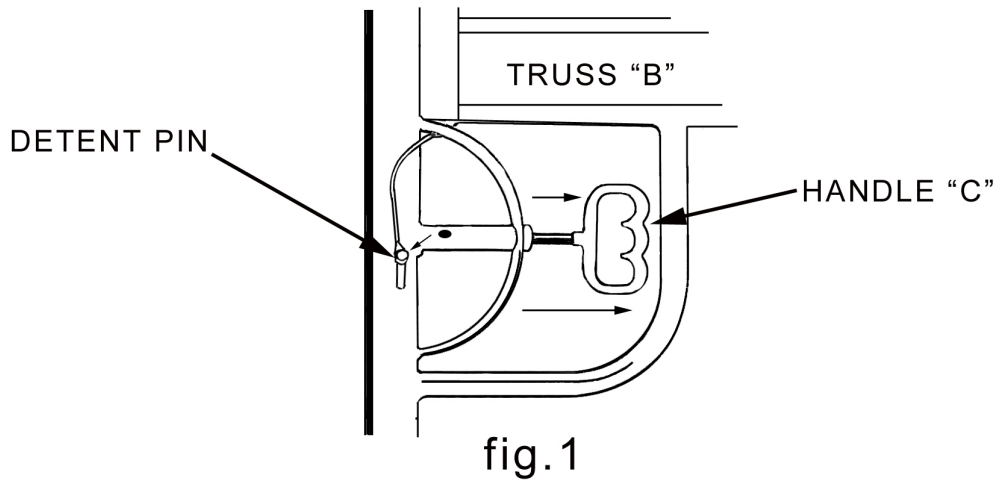
4	Casters “E” 5” 100 series 6” 200 series
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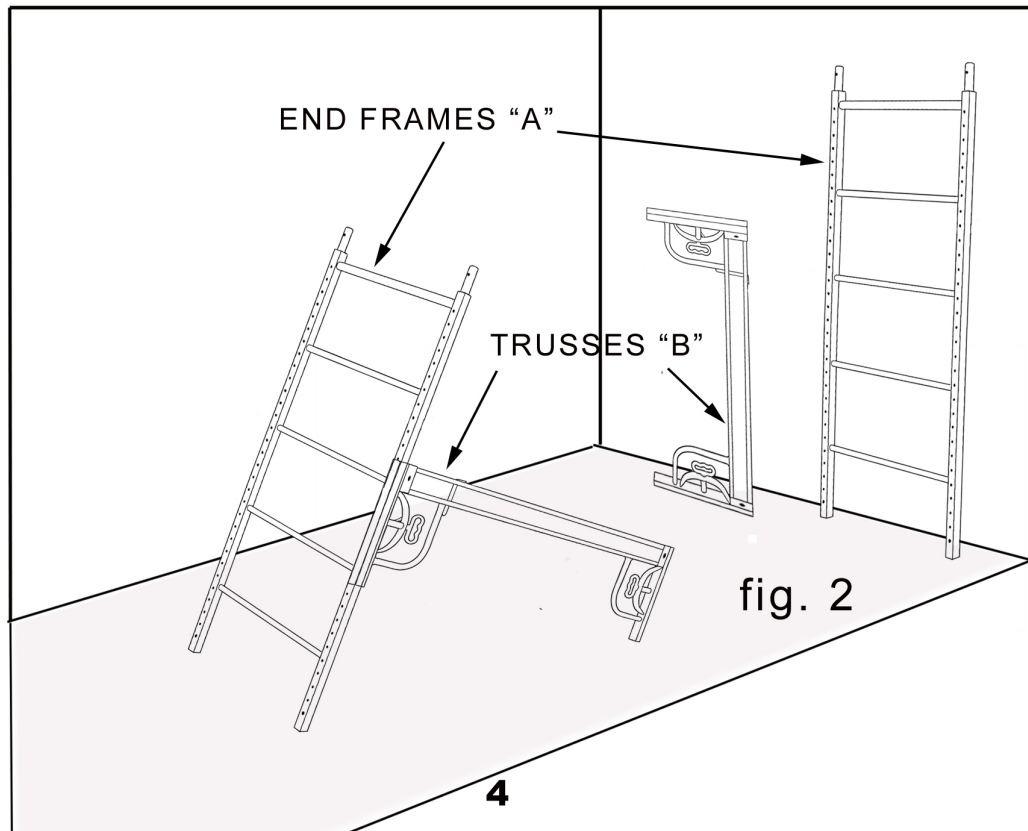
4	Clevis pins “F”
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CRAWLER[®] SCAFFOLD ASSEMBLY

- 1) Disengage the detent pin from the pull pin assembly found at each end of trusses B, as shown in fig. 1



- 2) While resting one end of the truss B on the floor, elevate the other end of the truss about waist high. Position one end frame A with your other hand, parallel with the U shaped channel found at the end of the truss B, as shown in fig. 2.
- 3) While pulling outward on handle C, as shown in fig.1, position the U shaped channel at the elevated end of truss B around the square column on end frame A. By releasing the handle C while sliding truss B vertically on end frame A, the spring loaded pin will engage into one of the holes located in end frame A.



- 4) Repeat step 3, securing the opposite end of truss B to the remaining end frame. Make certain the truss B is secured to both end frames and is level.
- 5) Install the remaining truss B at the desired platform height on the opposite side of the previously installed truss, as shown in fig. 3.
- 6) Reposition one or both of the trusses so that both trusses are at the same height, by pulling outward on handles C and moving truss B vertically until the desired height is achieved. To prevent the scaffold from collapsing, move one truss at a time and make certain the spring loaded pins have fully engaged into end frames A.

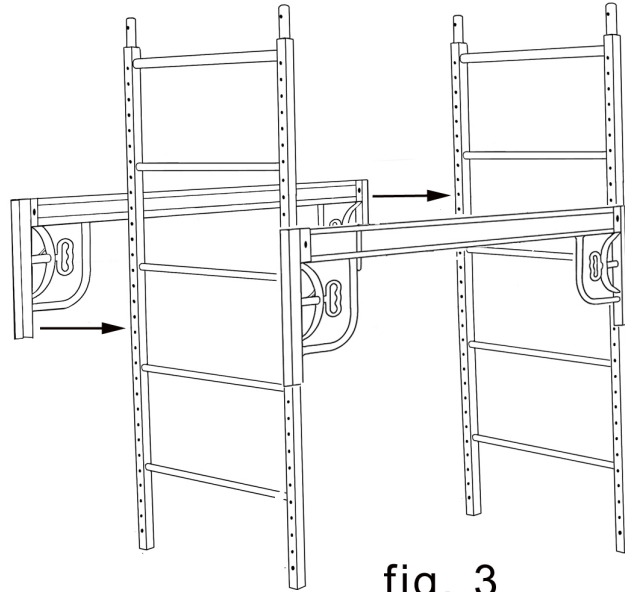


fig. 3

- 7) Insert the detent pin previously removed in step 1, through the pull pin assembly as shown in fig. 4A, NOTE: (A PADLOCK MAY BE USED INSTEAD OF THE SUPPLIED DETENT PIN FOR ADDITIONAL JOB SITE SECURITY) as shown in fig. 4B.

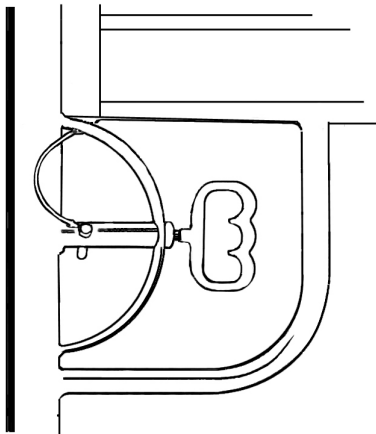


fig. 4A

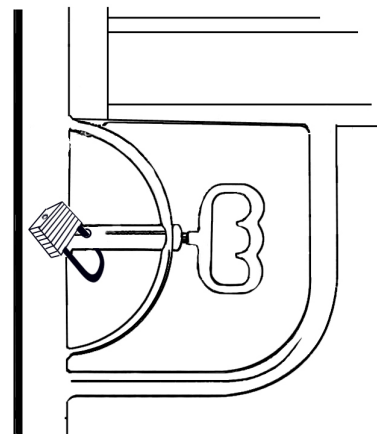


fig. 4B

- 8) Rotate the platform hold down clips to the disengaged position, as shown in fig. 5A.

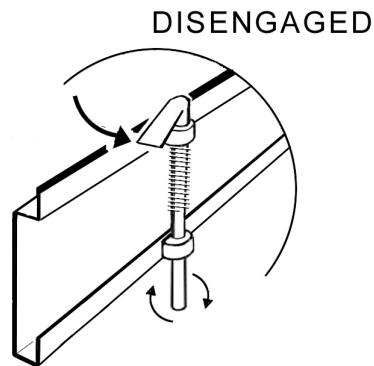


fig. 5A

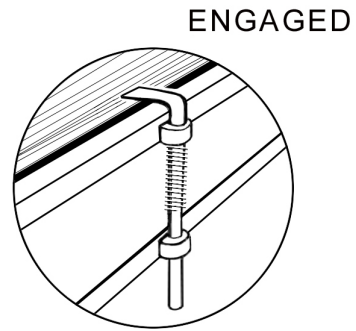


fig. 5B

- 9) Insert platform D into the recessed channel located on top of trusses B, as shown in fig. 6A. The platform should be flush with the top of both trusses B. Engage the platform hold down clip as shown in fig. 5B.

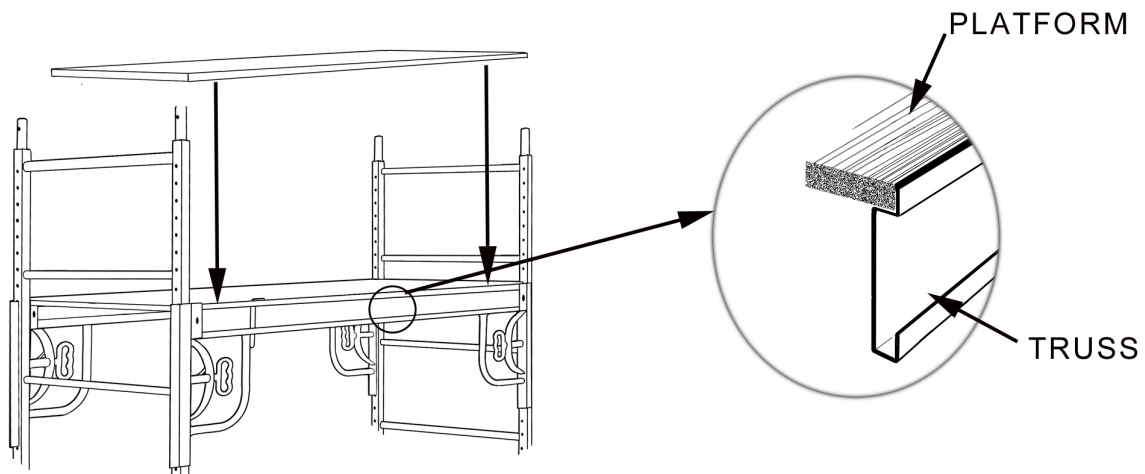


fig. 6A

NOTE:

200 series scaffolds include a integral "TRAP DOOR" in the platform, as shown in fig. 6B. Use the trap door to board and dismount the scaffold from inside the frame.

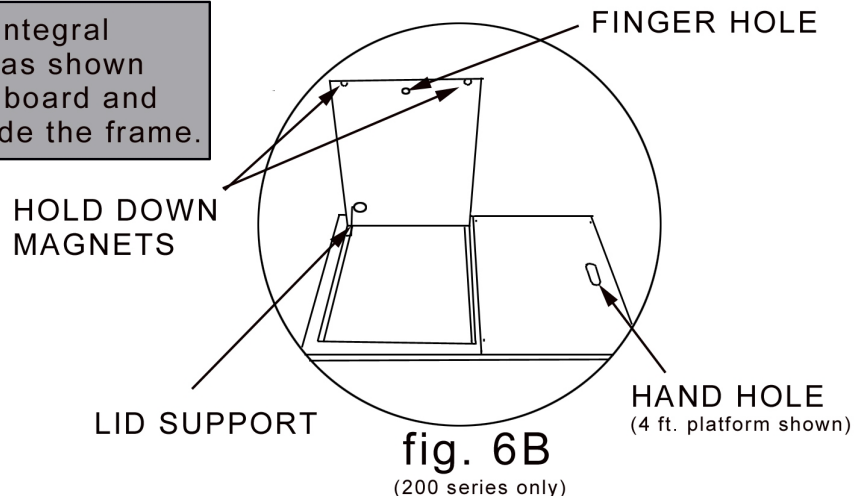
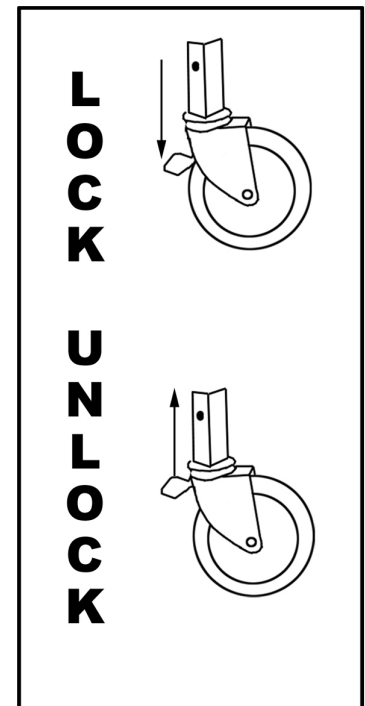
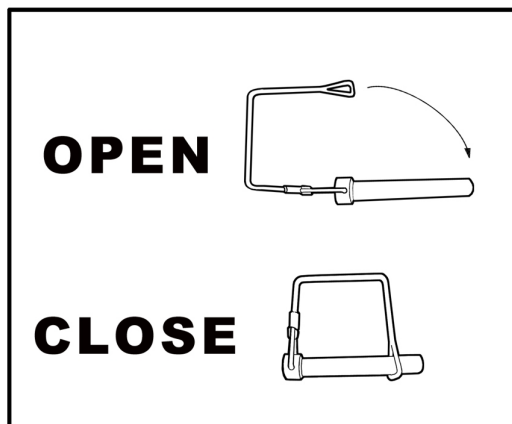
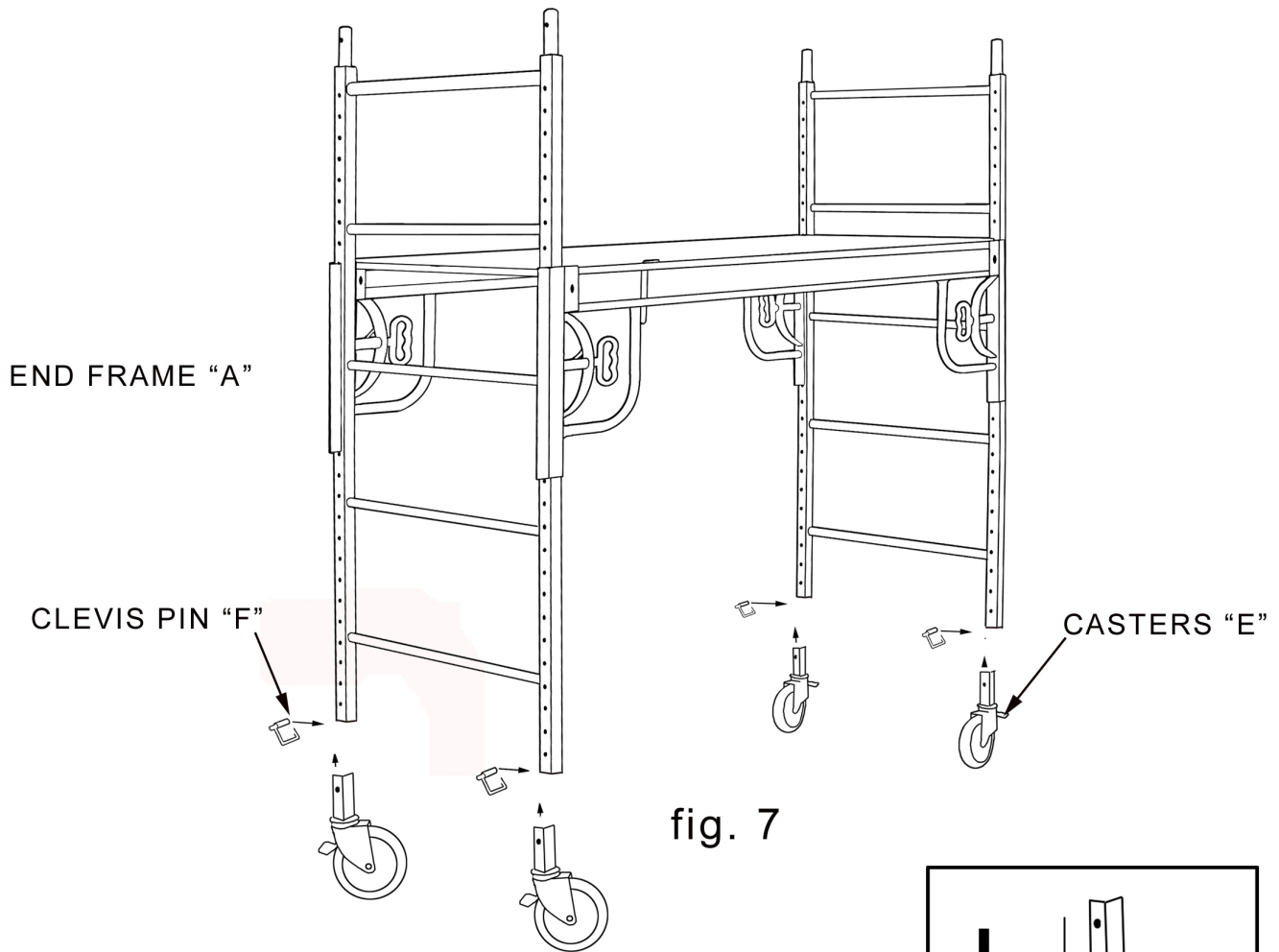


fig. 6B
(200 series only)

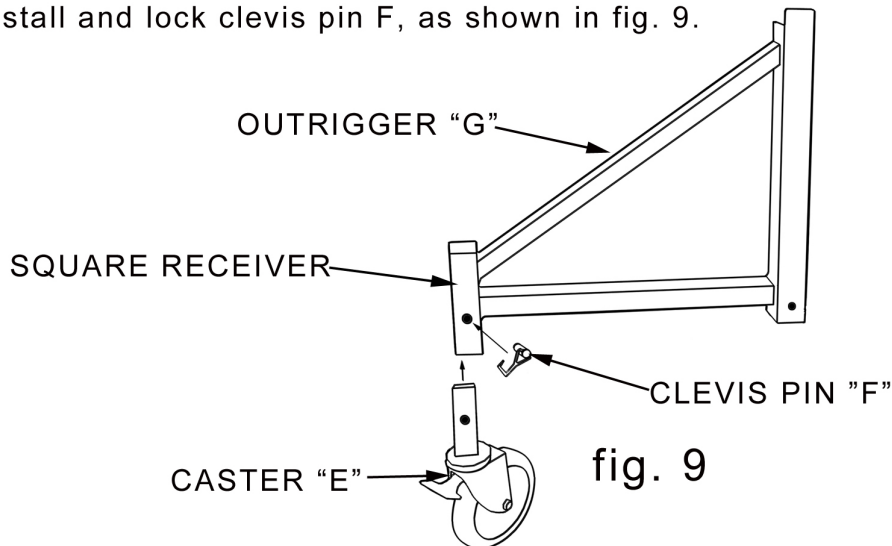
- 10) Lock all casters, as shown in fig. 8B. Insert the four casters E into the bottom of square columns on end frames A. Insert the clevis pins F through the bottom holes in end frame A and caster F, as shown in fig. 7. Close the clevis pin as shown fig. 8A.



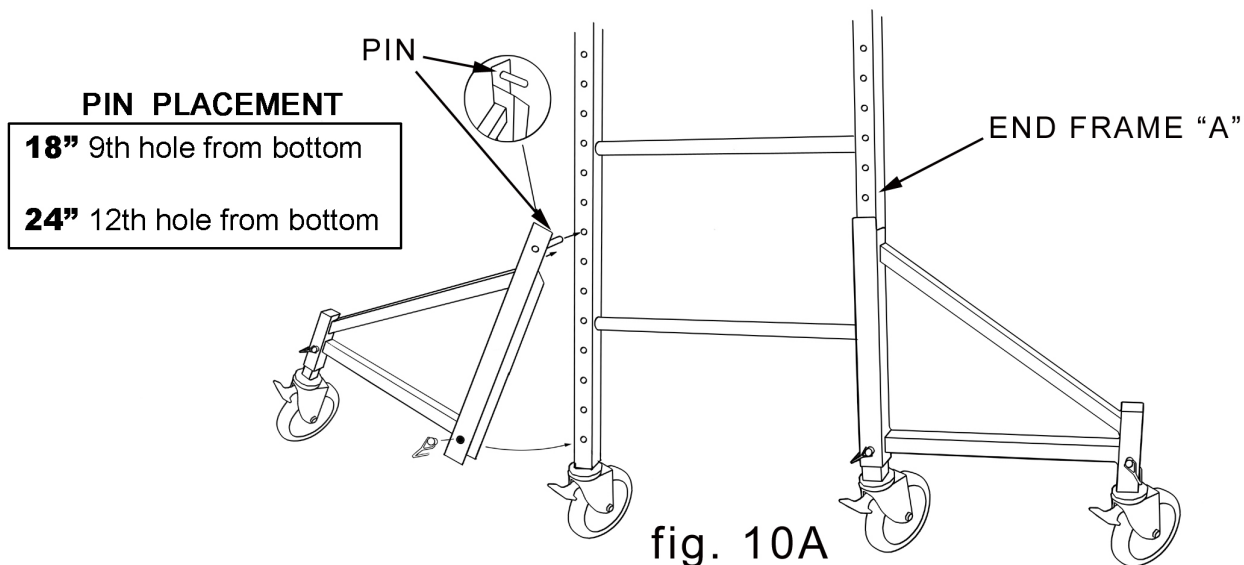
CRAWLER® OUTRIGGER INSTALLATION

REFER TO CHART ON PAGE 9 TO DETERMINE WHEN OUTRIGGERS ARE NEEDED.

- 1) Install caster E into the square receiver located at the end of outrigger G.
Install and lock clevis pin F, as shown in fig. 9.



- 2) Temporarily remove clevis pin F from the bottom of end frame A.
- 3) While holding the outrigger G at a 45 degree angle to end frame A, insert the pin located at the top of the outrigger, through the 9th hole from the bottom of the end frame when using 18" outriggers and the 12th hole when using 24" outriggers, as shown in fig.10A. Lower the outrigger, allowing the U shaped channel on the outrigger to seat into the square vertical tube on end frame A.
- 4) Make certain the hole in the bottom of the outrigger aligns with the hole in the bottom of the end frame. Reinstall the clevis pin previously removed in step #2 through the outrigger G, end frame A, and caster E.



CRAWLER® OUTRIGGER INSTALLATION

5) Repeat steps 1 - 4 installing all four outrigger as show in fig. 10B.

WARNING

OSHA reg 1926.452(w) (6) (iii) states Outrigger frames, when used, are installed on both sides of the scaffold.

Refer to the chart below to determine outrigger compliance

NOTE:

All 4 clevis pins must be installed

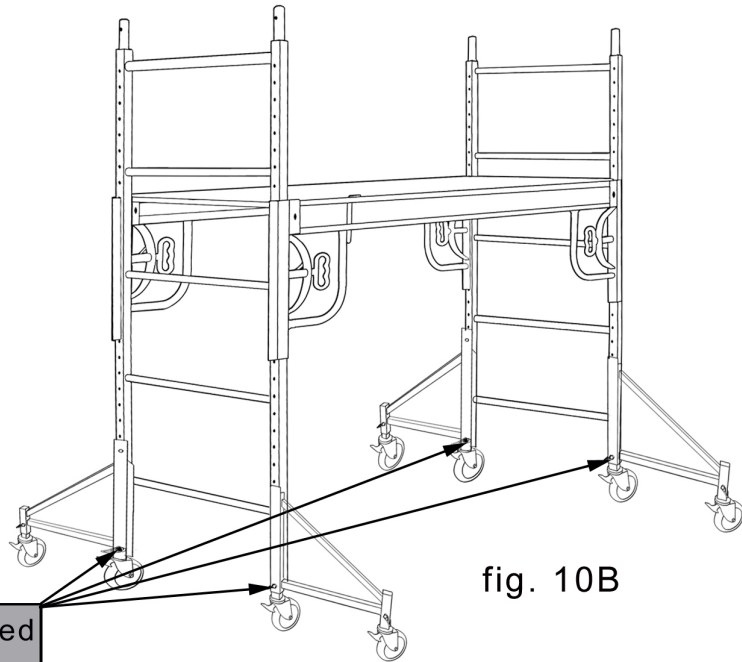


fig. 10B

Use the chart below to determine when outriggers and guardrails are needed to be OSHA compliant.

100 Series 200 Series	No. of 6 ft. End Frames	Max. Platform Height	Max. Working Height	Guard Rails Required	Outrigger Required	Meets 3:1 Height to Base Width Ratio	Meets 4:1 Height to Base Width Ratio
100 & 200	1	6'	12' 6"	no	no	yes	yes
100 & 200	2	11' 6"	18'	yes	yes (18")	yes	yes
100 & 200	3	17'	23' 6"	yes	yes (24")	yes	yes

NOTE:

Crawler Series 100 and 200 scaffolds (4' and 6' platform lengths), have a base width of 29". Base width is the span between the end frames when no outriggers are attached. Attaching outriggers increases base width by the length of each outrigger.

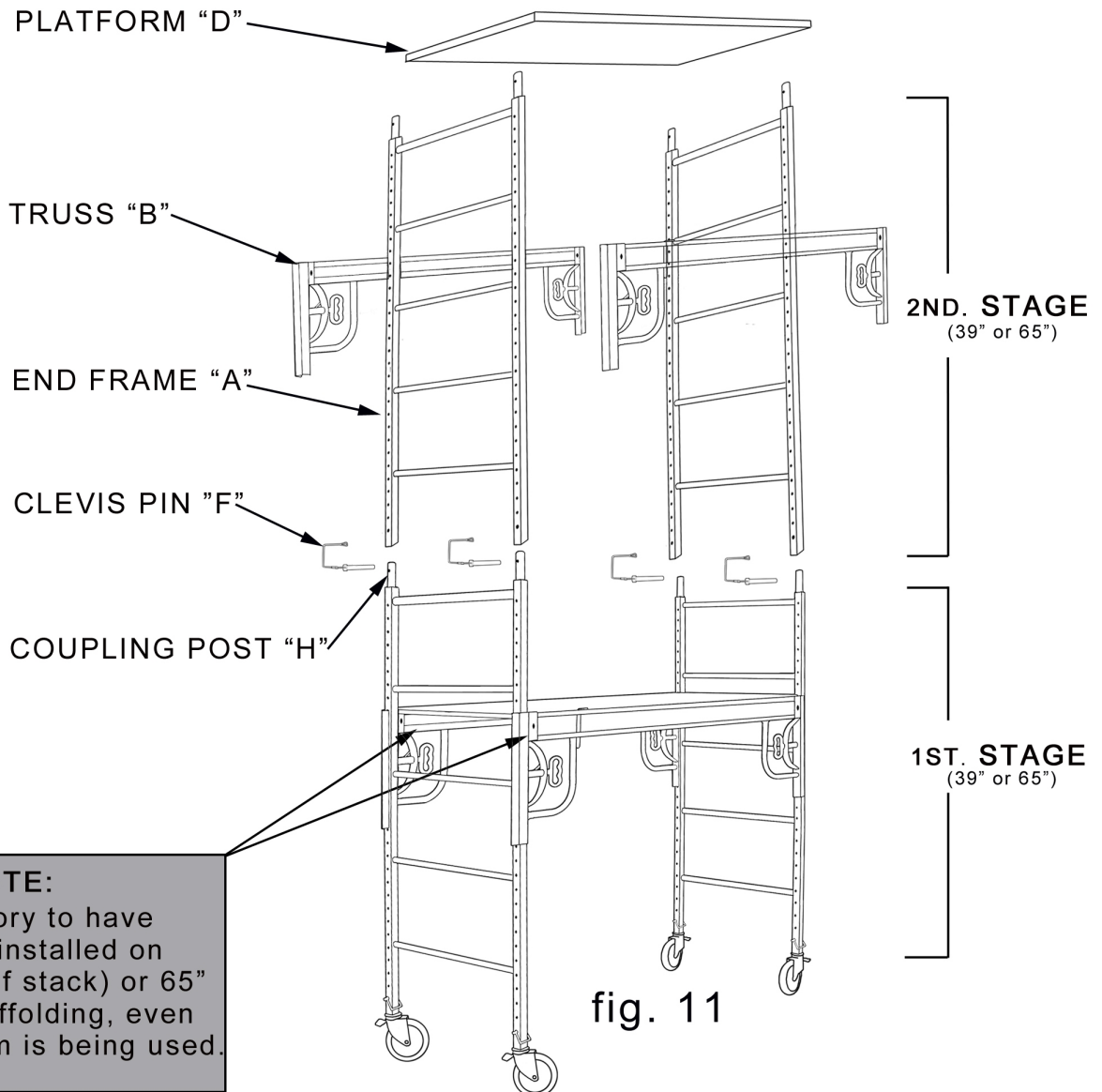
OSHA requires outriggers when the height of the platform exceeds 4 times the base width, (3 time the base width in some areas). As shown in the chart above, to be OSHA complaint, you can have a maximum platform height of 116 inches (4 x 29") without outriggers. State and local laws may be more strict than OSHA.

EMPLOYEES RIDING ON MOVING SCAFFOLDS

Allowed if "The height to base width ratio of the scaffold during movement is 2;1 or less....." OSHA reg 1926.452 (w) (6) (ii)

CRAWLER® ADDITIONAL HEIGHT PACKAGE

- 1) After assembling the first stage of scaffolding as previously shown in figures 1 - 7 and installing the necessary outriggers (if needed), as previously shown in figures 9 - 10, make sure to engage all caster brakes as previously shown in 8B on the scaffolding and outriggers, if used.
- 2) Insert the bottom of both end frames A of the 2nd stage over the top of coupling post H of the 1st stage. Secure end frames to the coupling post by inserting clevis pins F through the holes found in the end frames and coupling post. Make certain to close the clevis pin, as shown in fig. 8A.
- 3) Install both trusses B at the desired height, as previously shown in figures 1 - 4
- 4) Install the platform D as previously shown in figures 5 - 6



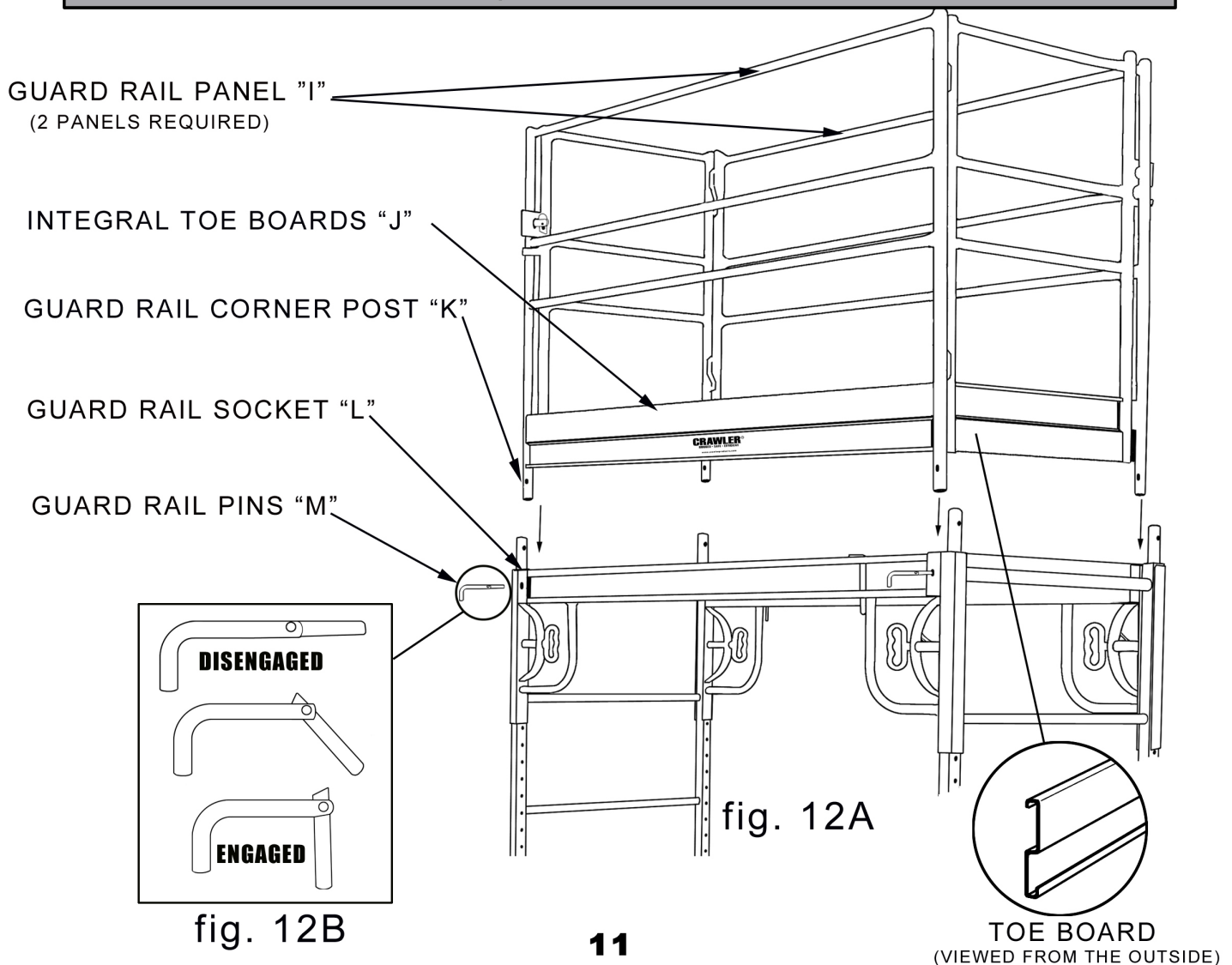
CRAWLER® GUARD RAIL INSTALLATION

NOTE: OSHA requires the use of guard rails when the platform is 10 feet or higher, however **Crawler® Products** recommends the use of guard rails when the platform height exceeds 4 feet.

- 1) Install the four guard rail corner post K into the guard rail sockets L found on the trusses, as shown in fig. 12A. Make certain the two guard rail panels are installed so the end gates swing inward and the label **INSIDE** is facing the inside of the guard rail system.
- 2) Install one guard rail pin M through each of the four sockets L and guard rail corner post K. To make insertion of guard rail pins easier, manually elevate the guard rail slightly to align holes in corner post K and socket L. Proper alignment will provide a 1/4" clearance between the toe boards and platform, allowing the end gate to operate properly.
- 3) Make certain the four pins M are engaged as shown in fig. 12B.



WARNING The guard rail pins must be used in order for the guard rail system to operate properly and serious injury or death could occur if the guard rails are not secured to the scaffold.



CRAWLER® GUARD RAIL OPERATION

- 1) The **CRAWLER®** 200 series scaffolds are equipped with a trap door located in the platform. Always board and dismount the scaffold from the inside of the frame using the trap door, when present. When no trap door is available climb the outside of the end frame, opening the end gate on the guard rail, as shown in fig.13A.
- 2) Make certain the gate is securely locked as shown in fig. 13B.

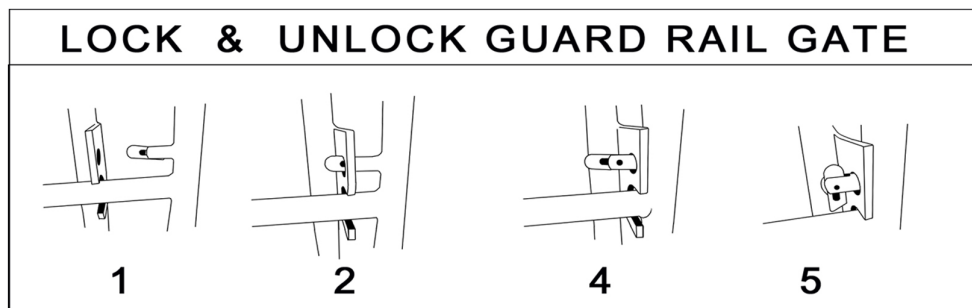
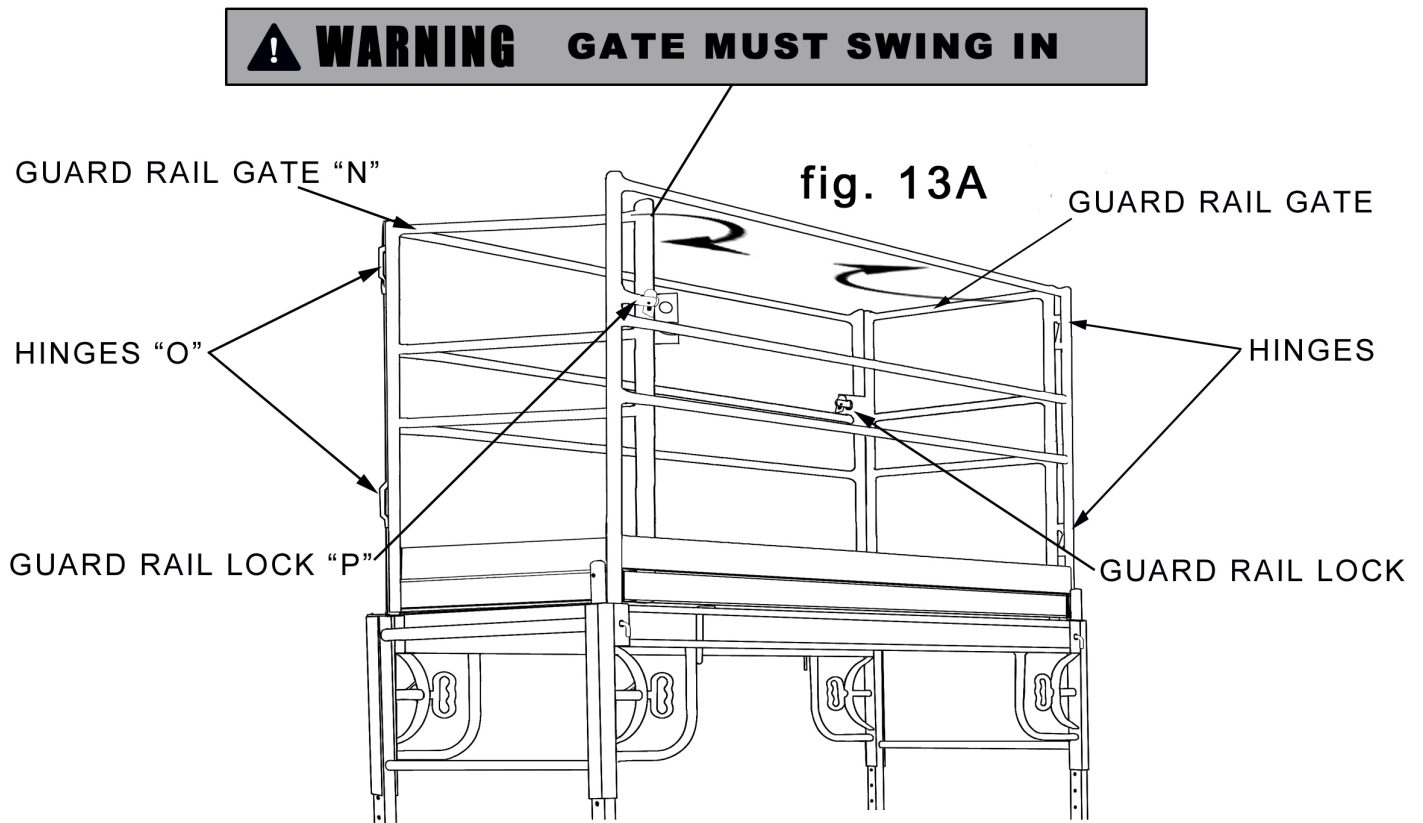


fig. 13B

U.S. Department of Labor

Occupational Safety & Health Administration

29 CFR Part 1926

Safety standards for Scaffolds Used in the Construction Industry; Final Rule
The effective date for this Standard is November 29, 1996 with some provisions effective September 27, 1997

PART 1926 SUBPART L SCAFFOLDS

1926.450 SCOPE, APPLICATIONS AND DEFINITIONS APPLICABLE TO THIS SUBPART

1926.450(a) "Scope and application."

This subpart applies to all scaffolds used in workplaces covered by this part. It does not apply to crane or derrick suspended personnel platforms, which are covered by 1926.550(g). The criteria for aerial lifts are set out exclusively in 1926.453.

1926.450(b) "Definitions."

"Adjustable suspension scaffold" means a suspension scaffold equipped with a hoist(s) that can be operated by an employee(s) on the scaffold.

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

"Boatswains' chair" means a single-point adjustable suspension scaffold consisting of a seat or sling designed to support one employee in a sitting position.

"Body belt (safety belt)" means a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

"Body harness" means a design of straps which may be secured about the employee in a manner to distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders, with means for attaching it to other components of a personal fall arrest system.

"Brace" means a rigid connection that holds one scaffold member in a fixed position with respect to another member, or to a building or structure.

"Bricklayers' square scaffold" means a supported scaffold composed of framed squares which support a platform.

"Carpenters' bracket scaffold" means a supported scaffold consisting of a platform supported by brackets attached to building or structural walls.

"Catenary scaffold" means a suspension scaffold consisting of a platform supported by two essentially horizontal and parallel ropes attached to structural members of a building or other structure. Additional support may be provided by vertical pickups.

"Chimney hoist" means a multi-point adjustable suspension scaffold used to provide access to work inside chimneys. (See "Multi-point adjustable suspension scaffold".)

"Cleat" means a structural block used at the end of a platform to prevent the platform from slipping off its supports. Cleats are also used to provide footing on sloped surfaces such as crawling boards.

"Competent person" means 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.

"Continuous run scaffold (Run scaffold)" means a two-point or multi-point adjustable suspension scaffold constructed using a series of interconnected braced scaffold members or supporting structures erected to form a continuous scaffold.

"Coupler" means a device for locking together the tubes of a tube and coupler scaffold.

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

"Deceleration device" means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyard, or automatic self-retracting lifeline lanyard, which dissipates a substantial amount of energy during a fall arrest or limits the energy imposed on an employee during fall arrest.

"Double pole (independent pole) scaffold" means a supported scaffold consisting of a platform(s) resting on cross beams (bearers) supported by ledgers and a double row of uprights independent of support (except ties, guys, braces) from any structure.

"Equivalent" means alternative designs, materials or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

"Exposed power lines" means electrical power lines which are accessible to employees and which are not shielded from contact. Such lines do not include extension cords or power tool cords.

"Eye or Eye splice" means a loop with or without a thimble at the end of a wire rope.

"Fabricated decking and planking" means manufactured platforms made of wood (including laminated wood, and solid sawn wood planks), metal or other materials.

"Fabricated frame scaffold (tubular welded frame scaffold)" means a scaffold consisting of a platform(s) supported on fabricated end frames with integral posts, horizontal bearers, and intermediate members.

"Failure" means load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

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

"Form scaffold" means a supported scaffold consisting of a platform supported by brackets attached to formwork.

"Guardrail system" means a vertical barrier, consisting of, but not limited to, top rails, midrails, and posts, erected to prevent employees from falling off a scaffold platform or walkway to lower levels.

"Hoist" means a manual or power-operated mechanical device to raise or lower a suspended scaffold.

"Horse scaffold" means a supported scaffold consisting of a platform supported by construction horses (saw horses). Horse scaffolds constructed of metal are sometimes known as trestle scaffolds.

"Independent pole scaffold" (see "Double pole scaffold").

"Interior hung scaffold" means a suspension scaffold consisting of a platform suspended from the ceiling or roof structure by fixed length supports.

"Ladder jack scaffold" means a supported scaffold consisting of a platform resting on brackets attached to ladders.

"Ladder stand" means a mobile, fixed-size, self-supporting ladder consisting of a wide flat tread ladder in the form of stairs.

"Landing" means a platform at the end of a flight of stairs.

"Large area scaffold" means a pole scaffold, tube and coupler scaffold, systems scaffold, or fabricated frame scaffold erected over substantially the entire work area. For example: a scaffold erected over the entire floor area of a room.

"Lean-to scaffold" means a supported scaffold which is kept erect by tilting it toward and resting it against a building or structure.

"Lifeline" means a component consisting of a flexible line that connects to an anchorage at one end to hang vertically (vertical lifeline), or that connects to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

"Lower levels" means areas below the level where the employee is located and to which an employee can fall. Such areas include, but are not limited to, ground levels, floors, roofs, ramps, runways, excavations, pits, tanks, materials, water, and equipment.

"Masons' adjustable supported scaffold" (see "Self-contained adjustable scaffold").

"Masons' multi-point adjustable suspension scaffold" means a continuous run suspension scaffold designed and used for masonry operations.

"Maximum intended load" means the total load of all persons, equipment, tools, materials, transmitted loads, and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.

"Mobile scaffold" means a powered or unpowered, portable, caster or wheel-mounted supported scaffold.

"Multi-level suspended scaffold" means a two-point or multi-point adjustable suspension scaffold with a series of platforms at various levels resting on common stirrups.

"Multi-point adjustable suspension scaffold" means a suspension scaffold consisting of a platform(s) which is suspended by more than two ropes from overhead supports and equipped with means to raise and lower the platform to desired work levels. Such scaffolds include chimney hoists.

"Needle beam scaffold" means a platform suspended from needle beams.

"Open sides and ends" means the edges of a platform that are more than 14 inches (36 cm) away horizontally 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 threshold distance is 18 inches (46 cm).

"Outrigger" means the structural member of a supported scaffold used to increase the base width of a scaffold in order to provide support for and increased stability of the scaffold.

"Outrigger beam (Thrustout)" means the structural member of a suspension scaffold or outrigger scaffold which 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" means a supported scaffold consisting of a platform resting on outrigger beams (thrustouts) projecting beyond the wall or face of the building or structure, the inboard ends of which are secured inside the building or structure.

"Overhand bricklaying" means the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. It includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

"Personal fall arrest system" means a system used to arrest an employee's fall. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or combinations of these.

"Platform" means a work surface elevated above lower levels. Platforms can be constructed using individual wood planks, fabricated planks, fabricated decks, and fabricated platforms.

"Pole scaffold" (see definitions for "Single-pole scaffold" and "Double (independent) pole scaffold").

"Power operated hoist" means a hoist which is powered by other than human energy.

"Pump jack scaffold" means a supported scaffold consisting of a platform supported by vertical poles and movable support brackets.

"Qualified" means 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.

"Rated load" means the manufacturer's specified maximum load to be lifted by a hoist or to be applied to a scaffold or scaffold component.

"Repair bracket scaffold" means a supported scaffold consisting of a platform supported by brackets which are secured in place around the circumference or perimeter of a chimney, stack, tank or other supporting structure by one or more wire ropes placed around the supporting structure.

"Roof bracket scaffold" means a rooftop supported scaffold consisting of a platform resting on angular-shaped supports.

"Runner (ledger or ribbon)" means the lengthwise horizontal spacing or bracing member which may support the bearers.

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

"Self-contained adjustable scaffold" means a combination supported and suspension scaffold consisting of an adjustable platform(s) mounted on an independent supporting frame(s) not a part of the object being worked on, and which is equipped with a means to permit the raising and lowering of the platform(s). Such systems include rolling roof rigs, rolling outrigger systems, and some masons' adjustable supported scaffolds.

"Shore scaffold" means a supported scaffold which is placed against a building or structure and held in place with props.

"Single-point adjustable suspension scaffold" means a suspension scaffold consisting 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.

"Single-pole scaffold" means a supported scaffold consisting of a platform(s) resting on bearers, the outside ends of which are supported on runners 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.

"Stair tower (Scaffold stairway/tower)" means a tower comprised of scaffold components and which contains internal stairway units and rest platforms. These towers are used to provide access to scaffold platforms and other elevated points such as floors and roofs.

"Stall load" means the load at which the prime-mover of a power-operated hoist stalls or the power to the prime-mover is automatically disconnected.

"Step, platform, and trestle ladder scaffold" means a platform resting directly on the rungs of step ladders or trestle ladders.

"Stilts" means a pair of poles or similar supports with raised footrests, used to permit walking above the ground or working surface.

"Stonesetters' multi-point adjustable suspension scaffold" means a continuous run suspension scaffold designed and used for stonesetters' operations.

"Supported scaffold" means one or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support.

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

"System scaffold" means a scaffold consisting of posts with fixed connection points that accept runners, bearers, and diagonals that can be interconnected at predetermined levels.

"Tank builders' scaffold" means a supported scaffold consisting of a platform resting on brackets that are either directly attached to a cylindrical tank or attached to devices that are attached to such a tank.

"Top plate bracket scaffold" means a scaffold supported by brackets that hook over or are attached to the top of a wall. This type of scaffold is similar to carpenters' bracket scaffolds and form scaffolds and is used in residential construction for setting trusses.

"Tube and coupler scaffold" means a supported or suspended scaffold consisting of a platform(s) 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)" means a suspension scaffold consisting of a platform supported by hangers (stirrups) suspended by two ropes from overhead supports and equipped with means to permit the raising and lowering of the platform to desired work levels.

"Unstable objects" means items whose strength, configuration, or lack of stability may allow them to become dislocated and shift and therefore may not properly support the loads imposed on them. Unstable objects do not constitute a safe base support for scaffolds, platforms, or employees. Examples include, but are not limited to, barrels, boxes, loose brick, and concrete blocks.

"Vertical pickup" means a rope used to support the horizontal rope in catenary scaffolds.

"Walkway" means a portion of a scaffold platform used only for access and not as a work level.

"Window jack scaffold" means a platform resting on a bracket or jack which projects through a window opening.

1926.451 GENERAL REQUIREMENTS
This section does not apply to aerial lifts, the criteria for which are set out exclusively in 1926.453.

1926.451(a)

Capacity

1926.451(a)(1)

Except as provided in paragraphs (a)(2), (a)(3), (a)(4), (a)(5) and (g) of this section, each scaffold and scaffold component shall be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it.

1926.451(a)(2)

Direct connections to roofs and floors, and counterweights used to balance adjustable suspension scaffolds, shall be capable of resisting at least 4 times the tipping moment imposed by the scaffold operating at the rated load of the hoist, or 1.5 (minimum) times the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater.

1926.451(a)(3)

Each suspension rope, including connecting hardware, used on non-adjustable suspension scaffolds shall be capable of supporting, without failure, at least 6 times the maximum intended load applied or transmitted to that rope.

1926.451(a)(4)

Each suspension rope, including connecting hardware, used on adjustable suspension scaffolds shall be capable of supporting, without failure, at least 6 times the maximum intended load applied or transmitted to that rope with the scaffold operating at either the rated load of the hoist, or 2 (minimum) times the stall load of the hoist, whichever is greater.

1926.451(a)(5)

The stall load of any scaffold hoist shall not exceed 3 times its rated load.

1926.451(a)(6)

Scaffolds shall be designed by a qualified person and shall be constructed and loaded in accordance with that design. Non-mandatory Appendix A to this subpart contains examples of criteria that will enable an employer to comply with paragraph (a) of this section.

1926.451(b)

Scaffold platform construction

1926.451(b)(1)

Each platform on all working levels of scaffolds shall be fully planked or decked between the front uprights and the guardrail supports as follows:

1926.451(b)(1)(i)

Each platform unit (e.g., scaffold plank, fabricated plank, fabricated deck, or fabricated platform) shall be installed so that the space between adjacent units and the space between the platform and the uprights is no more than 1 inch (2.5 cm) wide, except where the employer can demonstrate that a wider space is necessary (for example, to fit around uprights when side brackets are used to extend the width of the platform).

1926.451(b)(1)(ii)

Where the employer makes the debble, and employees on those platforms and walkways shall be protected from fall hazards by the use of guardrails and/or personal fall arrest systems.

1926.451(b)(2)

Except as provided in paragraphs (b)(2)(i) and (b)(2)(ii) of this section, each scaffold platform and walkway shall be at least 18 inches (46 cm) wide.

1926.451(b)(2)(i)

Each ladder jack scaffold, top plate bracket scaffold, roof bracket scaffold, and pump jack scaffold shall be at least 12 inches (30 cm) wide. There is no minimum width requirement for boatswains' chairs.

Note to paragraph (b)(2)(i): Pursuant to an administrative stay effective November 29, 1996 and published in the Federal Register on November 25, 1996, the requirement in paragraph (b)(2)(i) that roof bracket scaffolds be at least 12 inches wide is stayed until November 25, 1997 or until rulemaking regarding the minimum width of roof bracket scaffolds has been completed, whichever is later.

1926.451(b)(2)(ii)

Where scaffolds must be used in areas that the employer can demonstrate are so narrow that platforms and walkways cannot be at least 18 inches (46 cm) wide, such platforms and walkways shall be as wide as feasim falling.

1926.451(b)(3)

Except as provided in paragraphs (b)(3)(i) and (ii) of this section, the front edge of all platforms shall not be more than 14 inches (36 cm) from the face of the work, unless guardrail systems are erected along the front edge and/or personal fall arrest systems are used in accordance with paragraph (g) of this section to protect employees fromonstration provided for in paragraph (b)(1)(i) of this section, the platform shall be planked or decked as fully as possible and the remaining open space between the platform and the uprights shall not exceed 9 1/2 inches (24.1 cm).

Exception to paragraph (b)(1): The requirement in paragraph (b)(1) to provide full planking or decking does not apply to platforms used solely as walkways or solely by employees performing scaffold erection or dismantling. In these situations, only the planking that the employer establishes is necessary to provide safe working conditions is required.

1926.451(b)(3)(i)

The maximum distance from the face for outrigger scaffolds shall be 3 inches (8 cm);

1926.451(b)(3)(ii)

The maximum distance from the face for plastering and lathing operations shall be 18 inches (46 cm).

1926.451(b)(5)

1926.451(b)(5)(i)

Each end of a platform 10 feet or less in length shall not extend over its support more than 12 inches (30 cm) unless the platform is designed and installed so that the cantilevered portion of the platform is able to support employees and/or materials without tipping, or has guardrails which block employee access to the cantilevered end.

..1926.451(b)(6)

1926.451(b)(6)

On scaffolds where scaffold planks are abutted to create a long platform, each abutted end shall rest on a separate support surface. This provision does not preclude the use of common support members, such as "T" sections, to support abutting planks, or hook on platforms designed to rest on common supports.

1926.451(b)(7)

On scaffolds where platforms are overlapped to create a long platform, the overlap shall occur only over supports, and shall not be less than 12 inches (30 cm) unless the platforms are nailed together or otherwise restrained to prevent movement.

1926.451(b)(8)

At all points of a scaffold where the platform changes direction, such as turning a corner, any platform that rests on a bearer at an angle other than a right angle shall be laid first, and platforms which rest at right angles over the same bearer shall be laid second, on top of the first platform.

1926.451(b)(9)

Wood platforms shall not be covered with opaque finishes, except that platform edges may be covered or marked for identification. Platforms may be coated periodically with wood preservatives, fire-retardant finishes, and slip-resistant finishes; however, the coating may not obscure the top or bottom wood surfaces.

1926.451(b)(10)

Scaffold components manufactured by different manufacturers shall not be intermixed unless the components fit together without force and the scaffold's structural integrity is maintained by the user. Scaffold components manufactured by different manufacturers shall not be modified in order to intermix them unless a competent person determines the resulting scaffold is structurally sound.

..1926.451(b)(11)

1926.451(b)(11)

Scaffold components made of dissimilar metals shall not be used together unless a competent person has determined that galvanic action will not reduce the strength of any component to a level below that required by paragraph (a)(1) of this section.

1926.451(c)

Criteria for supported scaffolds

1926.451(c)(1)

Supported scaffolds with a height to base width (including outrigger supports, if used) ratio of more than four to one (4:1) shall be restrained from tipping by guying, tying, bracing, or equivalent means, as follows:

1926.451(c)(1)(i)

Guys, ties, and braces shall be installed at locations where horizontal members support both inner and outer legs.

1926.451(c)(1)(ii)

Guys, ties, and braces shall be installed according to the scaffold manufacturer's recommendations or at the closest horizontal member to the 4:1 height and be repeated vertically at locations of horizontal members every 20 feet (6.1 m) or less thereafter for scaffolds 3 feet (0.91 m) wide or less, and every 26 feet (7.9 m) or less thereafter for scaffolds greater than 3 feet (0.91 m) wide. The top guy, tie or brace of completed scaffolds shall be placed no further than the 4:1 height from the top. Such guys, ties and braces shall be installed at each end of the scaffold and at horizontal intervals not to exceed 30 feet (9.1 m) (measured from one end [not both] towards the other).

1926.451(c)(1)(iii)

Ties, guys, braces, or outriggers shall be used to prevent the tipping of supported scaffolds in all circumstances where an eccentric load, such as a cantilevered work platform, is applied or is transmitted to the scaffold.

..1926.451(c)(2)

1926.451(c)(2)

Supported scaffold poles, legs, posts, frames, and uprights shall bear on base plates and mud sills or other adequate firm foundation.

1926.451(c)(2)(i)

Footings shall be level, sound, rigid, and capable of supporting the loaded scaffold without settling or displacement.

1926.451(c)(2)(ii)

Unstable objects shall not be used to support scaffolds or platform units.

1926.451(c)(2)(iii)

Unstable objects shall not be used as working platforms.

1926.451(c)(2)(iv)

Front-end loaders and similar pieces of equipment shall not be used to support scaffold platforms unless they have been specifically designed by the manufacturer for such use.

1926.451(c)(2)(v)

Fork-lifts shall not be used to support scaffold platforms unless the entire platform is attached to the fork and the fork-lift is not moved horizontally while the platform is occupied.

1926.451(c)(3)

Supported scaffold poles, legs, posts, frames, and uprights shall be plumb and braced to prevent swaying and displacement.

1926.451(e)

Access This paragraph applies to scaffold access for all employees. Access requirements for employees erecting or dismantling supported scaffolds are specifically addressed in paragraph (e)(9) of this section.

1926.451(e)(1)

When scaffold platforms are more than 2 feet (0.6 m) above or below a point of access, portable ladders, hook-on ladders, attachable ladders, stair towers (scaffold stairways/towers), stairway-type ladders (such as ladder stands), ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface shall be used. Crossbraces shall not be used as a means of access.

1926.451(e)(2)

Portable, hook-on, and attachable ladders (Additional requirements for the proper construction and use of portable ladders are contained in subpart X of this part -- Stairways and Ladders):

1926.451(e)(2)(i)

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

1926.451(e)(2)(ii)

Hook-on and attachable ladders shall be positioned so that their bottom rung is not more than 24 inches (61 cm) above the scaffold supporting level;

1926.451(e)(2)(iii)

Hook-on and attachable ladders shall be positioned so that their bottom rung is not more than 24 inches (61 cm) above the scaffold supporting level;

1926.451(e)(2)(iii)

When hook-on and attachable ladders are used on a supported scaffold more than 35 feet (10.7 m) high, they shall have rest platforms at 35-foot (10.7 m) maximum vertical intervals.

1926.451(e)(2)(iv)

Hook-on and attachable ladders shall be specifically designed for use with the type of scaffold used;

1926.451(e)(2)(v)

Hook-on and attachable ladders shall have a minimum rung length of 11 1/2 inches (29 cm); and

1926.451(e)(2)(vi)

Hook-on and attachable ladders shall have uniformly spaced rungs with a maximum spacing between rungs of 16 3/4 inches.

1926.451(e)(3)

Stairway-type ladders shall:

1926.451(e)(3)(i)

Be positioned such that their bottom step is not more than 24 inches (61 cm) above the scaffold supporting level;

1926.451(e)(3)(ii)

Be provided with rest platforms at 12 foot (3.7 m) maximum vertical intervals;

1926.451(e)(3)(iii)

Have a minimum step width of 16 inches (41 cm), except that mobile scaffold stairway-type ladders shall have a minimum step width of 11 1/2 inches (30 cm); and

1926.451(e)(3)(iv)

Have slip-resistant treads on all steps and landings.

1926.451(e)(4)

Stairtowers (scaffold stairway/towers) shall be positioned such that their bottom step is not more than 24 inches (61 cm.) above the scaffold supporting level.

1926.451(e)(4)(i)

A stairrail consisting of a toprail and a midrail shall be provided on each side of each scaffold stairway.

1926.451(e)(4)(ii)

The toprail of each stairrail system shall also be capable of serving as a handrail, unless a separate handrail is provided.

1926.451(e)(4)(iii)

Handrails, and top rails that serve as handrails, shall provide an adequate handhold for employees grasping them to avoid falling.

1926.451(e)(4)(iv)

Stairrail systems and handrails shall be surfaced to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.

1926.451(e)(4)(v)

The ends of stairrail systems and handrails shall be constructed so that they do not constitute a projection hazard.

1926.451(e)(4)(vi)

Handrails, and top rails that are used as handrails, shall be at least 3 inches (7.6 cm) from other objects.

..1926.451(e)(4)(vii)

1926.451(e)(4)(vii)

Stairrails shall be not less than 28 inches (71 cm) nor more than 37 inches (94 cm) from the upper surface of the stairrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

1926.451(e)(4)(viii)

A landing platform at least 18 inches (45.7 cm) wide by at least 18 inches (45.7 cm) long shall be provided at each level.

1926.451(e)(4)(ix)

Each scaffold stairway shall be at least 18 inches (45.7 cm) wide between stairrails.

1926.451(e)(4)(x)

Treads and landings shall have slip-resistant surfaces.

1926.451(e)(4)(xi)

Stairways shall be installed between 40 degrees and 60 degrees from the horizontal.

1926.451(e)(4)(xii)

Guardrails meeting the requirements of paragraph (g)(4) of this section shall be provided on the open sides and ends of each landing.

1926.451(e)(4)(xiii)

Riser height shall be uniform, within 1/4 inch, (0.6 cm) 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.

1926.451(e)(4)(xiv)

Tread depth shall be uniform, within 1/4 inch, for each flight of stairs.

..1926.451(e)(5)

1926.451(e)(5)

Ramps and walkways.

1926.451(e)(5)(i)

Ramps and walkways 6 feet (1.8 m) or more above lower levels shall have guardrail systems which comply with subpart M of this part -- Fall Protection;

1926.451(e)(5)(ii)

No ramp or walkway shall be inclined more than a slope of one (1) vertical to three (3) horizontal (20 degrees above the horizontal).

1926.451(e)(5)(iii)

If the slope of a ramp or a walkway is steeper than one (1) vertical in eight (8) horizontal, the ramp or walkway shall have cleats not more than fourteen (14) inches (35 cm) apart which are securely fastened to the planks to provide footing.

1926.451(e)(6)

Integral prefabricated scaffold access frames shall:

1926.451(e)(6)(i)

Be specifically designed and constructed for use as ladder rungs;

1926.451(e)(6)(ii)

Have a rung length of at least 8 inches (20 cm);

1926.451(e)(6)(iii)

Not be used as work platforms when rungs are less than 11 1/2 inches in length, unless each affected employee uses fall protection, or a positioning device, which complies with 1926.502;

1926.451(e)(6)(iv)

Be uniformly spaced within each frame section;

..1926.451(e)(6)(v)

1926.451(e)(6)(v)

Be provided with rest platforms at 35-foot (10.7 m) maximum vertical intervals on all supported scaffolds more than 35 feet (10.7 m) high; and

1926.451(e)(6)(vi)

Have a maximum spacing between rungs of 16 3/4 inches (43 cm). Non-uniform rung spacing caused by joining end frames together is allowed, provided the resulting spacing does not exceed 16 3/4 inches (43 cm).

1926.451(e)(7)

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

1926.451(e)(8)

Direct access to or from another surface shall be used only when the scaffold is not more than 14 inches (36 cm) horizontally and not more than 24 inches (61 cm) vertically from the other surface.

1926.451(e)(9)

Effective September 2, 1997, access for employees erecting or dismantling supported scaffolds shall be in accordance with the following:

1926.451(e)(9)(i)

The employer shall provide safe means of access for each employee erecting or dismantling a scaffold where the provision of safe access is feasible and does not create a greater hazard. The employer shall have a competent person determine whether it is feasible or would pose a greater hazard to provide, and have employees use a safe means of access. This determination shall be based on site conditions and the type of scaffold being erected or dismantled.

1926.451(e)(9)(ii)

Hook-on or attachable ladders shall be installed as soon as scaffold erection has progressed to a point that permits safe installation and use.

1926.451(e)(9)(iii)

When erecting or dismantling tubular welded frame scaffolds, (end) frames, with horizontal members that are parallel, level and are not more than 22 inches apart vertically may be used as climbing devices for access, provided they are erected in a manner that creates a usable ladder and provides good hand hold and foot space.

1926.451(e)(9)(iv)

Cross braces on tubular welded frame scaffolds shall not be used as a means of access or egress.

1926.451(f)

Use

1926.451(f)(1)

Scaffolds and scaffold components shall not be loaded in excess of their maximum intended loads or rated capacities, whichever is less.

1926.451(f)(2)

The use of shore or lean-to scaffolds is prohibited.

..1926.451(f)(3)

1926.451(f)(3)

Scaffolds and scaffold components shall be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity.

1926.451(f)(4)

Any part of a scaffold damaged or weakened such that its strength is less than that required by paragraph (a) of this section shall be immediately repaired or replaced, braced to meet those provisions, or removed from service until repaired.

1926.451(f)(5)

Scaffolds shall not be moved horizontally while employees are on them, unless they have been designed by a registered professional engineer specifically for such movement or, for mobile scaffolds, where the provisions of 1926.452(w) are followed.

1926.451(f)(6)

The clearance between scaffolds and power lines shall be as follows: Scaffolds shall not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than as follows:

*Insulated Lines			
Voltage	Minimum distance	Alternatives	
Less than 300 volts.	3 feet (0.9 m)		
300 volts to 50 kv.	10 feet (3.1 m)		
More than 50 kv.....	10 feet (3.1 m) plus	2 times the length of the line	
	0.4 inches (1.0 cm)	for each 1 kv over	insulator, but never less than 10 feet (3.1 m).
*Uninsulated lines			
Voltage	Minimum distance	Alternatives	
Less than 50 kv.....	10 feet (3.1 m).		
More than 50 kv.....	10 feet (3.1 m) plus	2 times the length of the line insulator,	
	0.4 inches (1.0 cm)	for each 1 kv over	but never less than 10 feet (3.1 m).
	50 kv.		

Exception to paragraph (f)(6): Scaffolds and materials may be closer to power lines than specified above where such clearance is necessary for performance of work, and only after the utility company, or electrical system operator, has been notified of the need to work closer and the utility company, or electrical system operator, has deenergized the lines, relocated the lines, or installed protective coverings to prevent accidental contact with the lines.

Scaffolds shall be erected, moved, dismantled, or altered only under the supervision and direction of a competent person qualified in scaffold erection, moving, dismantling or alteration. Such activities shall be performed only by experienced and trained employees selected for such work by the competent person.

..1926.451(f)(8)

1926.451(f)(8)

Employees shall be prohibited from working on scaffolds covered with snow, ice, or other slippery material except as necessary for removal of such materials.

1926.451(f)(9)

Where swinging loads are being hoisted onto or near scaffolds such that the loads might contact the scaffold, tag lines or equivalent measures to control the loads shall be used.

1926.451(f)(10)

Suspension ropes supporting adjustable suspension scaffolds shall be of a diameter large enough to provide sufficient surface area for the functioning of brake and hoist mechanisms.

1926.451(f)(11)

Suspension ropes shall be shielded from heat-producing processes. When acids or other corrosive substances are used on a scaffold, the ropes shall be shielded, treated to protect against the corrosive substances, or shall be of a material that will not be damaged by the substance being used.

1926.451(f)(12)

Work on or from scaffolds is prohibited during storms or high winds unless a competent person has determined that it is safe for employees to be on the scaffold and those employees are protected by a personal fall arrest system or wind screens. Wind screens shall not be used unless the scaffold is secured against the anticipated wind forces imposed.

1926.451(f)(13)

Debris shall not be allowed to accumulate on platforms.

..1926.451(f)(14)

1926.451(f)(14)

Makeshift devices, such as but not limited to boxes and barrels, shall not be used on top of scaffold platforms to increase the working level height of employees.

1926.451(f)(15)

Ladders shall not be used on scaffolds to increase the working level height of employees, except on large area scaffolds where employers have satisfied the following criteria:

1926.451(f)(15)(i)

When the ladder is placed against a structure which is not a part of the scaffold, the scaffold shall be secured against the sideways thrust exerted by the ladder;

1926.451(f)(15)(ii)

1926.451(f)(15)(ii)

The platform units shall be secured to the scaffold to prevent their movement;

1926.451(f)(15)(iii)

The ladder legs shall be on the same platform or other means shall be provided to stabilize the ladder against unequal platform deflection, and

1926.451(f)(15)(iv)

The ladder legs shall be secured to prevent them from slipping or being pushed off the platform.

1926.451(f)(16)

Platforms shall not deflect more than 1/60 of the span when loaded.

1926.451(f)(17)

To reduce the possibility of welding current arcing through the suspension wire rope when performing welding from suspended scaffolds, the following precautions shall be taken, as applicable:

..1926.451(f)(17)(i)

1926.451(f)(17)(i)

An insulated thimble shall be used to attach each suspension wire rope to its hanging support (such as cornice hook or outrigger). Excess suspension wire rope and any additional independent lines from grounding shall be insulated;

1926.451(f)(17)(ii)

The suspension wire rope shall be covered with insulating material extending at least 4 feet (1.2 m) above the hoist. If there is a tail line below the hoist, it shall be insulated to prevent contact with the platform. The portion of the tail line that hangs free below the scaffold shall be guided or retained, or both, so that it does not become grounded;

1926.451(f)(17)(iii)

Each hoist shall be covered with insulated protective covers;

1926.451(f)(17)(iv)

In addition to a work lead attachment required by the welding process, a grounding conductor shall be connected from the scaffold to the structure. The size of this conductor shall be at least the size of the welding process work lead, and this conductor shall not be in series with the welding process or the work piece;

1926.451(f)(17)(v)

If the scaffold grounding lead is disconnected at any time, the welding machine shall be shut off; and

1926.451(f)(17)(vi)

An active welding rod or uninsulated welding lead shall not be allowed to contact the scaffold or its suspension system.

..1926.451(g)

1926.451(g)

Fall protection

1926.451(g)(1)

Each employee on a scaffold more than 10 feet (3.1 m) above a lower level shall be protected from falling to that lower level. Paragraphs (g)(1)(i) through (vii) of this section establish the types of fall protection to be provided to the employees on each type of scaffold. Paragraph (g)(2) of this section addresses fall protection for scaffold erectors and dismantlers.

Note to paragraph (g)(1): The fall protection requirements for employees installing suspension scaffold support systems on floors, roofs, and other elevated surfaces are set forth in subpart M of this part.

1926.451(g)(1)(i)

Each employee on a boatswains' chair, catenary scaffold, float scaffold, needle beam scaffold, or ladder jack scaffold shall be protected by a personal fall arrest system;

1926.451(g)(1)(ii)

Each employee on a single-point or two-point adjustable suspension scaffold shall be protected by both a personal fall arrest system and guardrail system;

1926.451(g)(1)(iii)

Each employee on a crawling board (chicken ladder) shall be protected by a personal fall arrest system, a guardrail system (with minimum 200 pound toprail capacity), or by a three-fourth inch (1.9 cm) diameter grabline or equivalent handhold securely fastened beside each crawling board;

1926.451(g)(1)(iv)

Each employee on a self-contained adjustable scaffold shall be protected by a guardrail system (with minimum 200 pound toprail capacity) when the platform is supported by the frame structure, and by both a personal fall arrest system and a guardrail system (with minimum 200 pound toprail capacity) when the platform is supported by ropes;

..1926.451(g)(1)(v)

1926.451(g)(1)(v)

Each employee on a walkway located within a scaffold shall be protected by a guardrail system (with minimum 200 pound toprail capacity) installed within 9 1/2 inches (24.1 cm) of and along at least one side of the walkway.

1926.451(g)(1)(vi)

Each employee performing overhand bricklaying operations from a supported scaffold shall be protected from falling from all open sides and ends of the scaffold (except at the side next to the wall being laid) by the use of a personal fall arrest system or guardrail system (with minimum 200 pound toprail capacity).

1926.451(g)(1)(vii)

For all scaffolds not otherwise specified in paragraphs (g)(1)(i) through (g)(1)(vi) of this section, each employee shall be protected by the use of personal fall arrest systems or guardrail systems meeting the requirements of paragraph (g)(4) of this section.

1926.451(g)(2)

Effective September 2, 1997, the employer shall have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Employers are required to provide fall protection for employees erecting or dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.

..1926.451(g)(3)

1926.451(g)(3)

In addition to meeting the requirements of 1926.502(d), personal fall arrest systems used on scaffolds shall be attached by lanyard to a vertical lifeline, horizontal lifeline, or scaffold structural member. Vertical lifelines shall not be used when overhead components, such as overhead protection or additional platform levels, are part of a single-point or two-point adjustable suspension scaffold.

1926.451(g)(3)(i)

When vertical lifelines are used, they shall be fastened to a fixed safe point of anchorage, shall be independent of the scaffold, and shall be protected from sharp edges and abrasion. Safe points of anchorage include structural members of buildings, but do not include standpipes, vents, other piping systems, electrical conduit, outrigger beams, or counterweights.

1926.451(g)(3)(ii)

When horizontal lifelines are used, they shall be secured to two or more structural members of the scaffold, or they may be looped around both suspension and independent suspension lines (on scaffolds so equipped) above the hoist and brake attached to the end of the scaffold. Horizontal lifelines shall not be attached only to the suspension ropes.

1926.451(g)(3)(iii)

When lanyards are connected to horizontal lifelines or structural members on a single-point or two-point adjustable suspension scaffold, the scaffold shall be equipped with additional independent support lines and automatic locking devices capable of stopping the fall of the scaffold in the event one or both of the suspension ropes fail. The independent support lines shall be equal in number and strength to the suspension ropes.

..1926.451(g)(3)(iv)

1926.451(g)(3)(iv)

Vertical lifelines, independent support lines, and suspension ropes shall not be attached to each other, nor shall they be attached to or use the same point of anchorage, nor shall they be attached to the same point on the scaffold or personal fall arrest system.

1926.451(g)(4)

Guardrail systems installed to meet the requirements of this section shall comply with the following provisions (guardrail systems built in accordance with Appendix A to this subpart will be deemed to meet the requirements of paragraphs (g)(4)(vii), (viii), and (ix) of this section):

1926.451(g)(4)(i)

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

1926.451(g)(4)(ii)

The top edge height of toprails or equivalent member on supported scaffolds manufactured or placed in service after January 1, 2000 shall be installed between 38 inches (0.97 m) and 45 inches (1.2 m) above the platform surface. The top edge height on supported scaffolds manufactured and placed in service before January 1, 2000, and on all suspended scaffolds where both a guardrail and a personal fall arrest system are required shall be between 36 inches (0.9 m) and 45 inches (1.2 m). When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria of paragraph (g)(4).

..1926.451(g)(4)(iii)

1926.451(g)(4)(iii)

When midrails, screens, mesh, intermediate vertical members, solid panels, or equivalent structural members are used, they shall be installed between the top edge of the guardrail system and the scaffold platform.

1926.451(g)(4)(iv)

When midrails are used, they shall be installed at a height approximately midway between the top edge of the guardrail system and the platform surface.

1926.451(g)(4)(v)

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

1926.451(g)(4)(vi)

When intermediate members (such as balusters or additional rails) are used, they shall not be more than 19 inches (48 cm) apart.

1926.451(g)(4)(vii)

Each toprail or equivalent member of a guardrail system shall be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along its top edge of at least 100 pounds (445 n) for guardrail systems installed on single-point adjustable suspension scaffolds or two-point adjustable suspension scaffolds, and at least 200 pounds (890 n) for guardrail systems installed on all other scaffolds.

1926.451(g)(4)(viii)

When the loads specified in paragraph (g)(4)(vii) of this section are applied in a downward direction, the top edge shall not drop below the height above the platform surface that is prescribed in paragraph (g)(4)(ii) of this section.

..1926.451(g)(4)(ix)

1926.451(g)(4)(ix)

Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members of a guardrail system shall be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along the midrail or other member of at least 75 pounds (333 n) for guardrail systems with a minimum 100 pound toprail capacity, and at least 150 pounds (666 n) for guardrail systems with a minimum 200 pound toprail capacity.

1926.451(g)(4)(x)

Suspension scaffold hoists and non-walk-through stirrups may be used as end guardrails, if the space between the hoist or stirrup and the side guardrail or structure does not allow passage of an employee to the end of the scaffold.

1926.451(g)(4)(xi)

Guardrails shall be surfaced to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

1926.451(g)(4)(xii)

The ends of all rails shall not overhang the terminal posts except when such overhang does not constitute a projection hazard to employees.

1926.451(g)(4)(xiii)

Steel or plastic banding shall not be used as a toprail or midrail.

1926.451(g)(4)(xiv)

Manila or plastic (or other synthetic) rope being used for toprails or midrails shall be inspected by a competent person as frequently as necessary to ensure that it continues to meet the strength requirements of paragraph (g) of this section.

..1926.451(g)(4)(xv)

1926.451(g)(4)(xv)

Crossbracing is acceptable in place of a midrail when the crossing point of two braces is between 20 inches (0.5 m) and 30 inches (0.8 m) above the work platform or as a toprail when the crossing point of two braces is between 38 inches (0.97 m) and 48 inches (1.3 m) above the work platform. The end points at each upright shall be no more than 48 inches (1.3 m) apart.

1926.451(h)

Falling object protection

1926.451(h)(1)

In addition to wearing hardhats each employee on a scaffold shall be provided with additional protection from falling hand tools, debris, and other small objects through the installation of toeboards, screens, or guardrail systems, or through the erection of debris nets, catch platforms, or canopy structures that contain or deflect the falling objects. When the falling objects are too large, heavy or massive to be contained or deflected by any of the above-listed measures, the employer shall place such potential falling objects away from the edge of the surface from which they could fall and shall secure those materials as necessary to prevent their falling.

1926.451(h)(2)

Where there is a danger of tools, materials, or equipment falling from a scaffold and striking employees below, the following provisions apply:

1926.451(h)(2)(i)

The area below the scaffold to which objects can fall shall be barricaded, and employees shall not be permitted to enter the hazard area; or

..1926.451(h)(2)(ii)

1926.451(h)(2)(ii)

A toeboard shall be erected along the edge of platforms more than 10 feet (3.1 m) above lower levels for a distance sufficient to protect employees below, except on float (ship) scaffolds where an edging of 3/4 x 1 1/2 inch (2 x 4 cm) wood or equivalent may be used in lieu of toeboards;

1926.451(h)(2)(iii)

Where tools, materials, or equipment are piled to a height higher than the top edge of the toeboard, paneling or screening extending from the toeboard or platform to the top of the guardrail shall be erected for a distance sufficient to protect employees below; or

1926.451(h)(2)(iv)

A guardrail system shall be installed with openings small enough to prevent passage of potential falling objects; or

1926.451(h)(2)(v)

A canopy structure, debris net, or catch platform strong enough to withstand the impact forces of the potential falling objects shall be erected over the employees below.

1926.451(h)(3)

Canopies, when used for falling object protection, shall comply with the following criteria:

1926.451(h)(3)(i)

Canopies shall be installed between the falling object hazard and the employees.

..1926.451(h)(3)(ii)

1926.451(h)(3)(ii)

When canopies are used on suspension scaffolds for falling object protection, the scaffold shall be equipped with additional independent support lines equal in number to the number of points supported, and equivalent in strength to the strength of the suspension ropes.

1926.451(h)(3)(iii)

Independent support lines and suspension ropes shall not be attached to the same points of anchorage.

1926.451(h)(4)

Where used, toeboards shall be:

1926.451(h)(4)(i)

Capable of withstanding, without failure, a force of at least 50 pounds (222 n) applied in any downward or horizontal direction at any point along the toeboard (toeboards built in accordance with Appendix A to this subpart will be deemed to meet this requirement); and

1926.451(h)(4)(ii)

At least three and one-half inches (9 cm) high from the top edge of the toeboard to the level of the walking/working surface. Toeboards shall be securely fastened in place at the outermost edge of the platform and have not more than 1/4 inch (0.7 cm) clearance above the walking/working surface. Toeboards shall be solid or with openings not over one inch (2.5 cm) in the greatest dimension.

1926.452 ADDITIONAL REQUIREMENTS APPLICABLE TO SPECIFIC TYPES OF SCAFFOLDS.

In addition to the applicable requirements of 1926.451, the following requirements apply to the specific types of scaffolds indicated. Scaffolds not specifically addressed by 1926.452, such as but not limited to systems scaffolds, must meet the requirements of 1926.451.

1926.452(b)

Tube and coupler scaffolds.

1926.452(b)(1)

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

..1926.452(b)(2)

1926.452(b)(2)

Transverse bracing forming an "X" across the width of the scaffold shall be 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. Bracing shall extend diagonally from the inner or outer posts or runners upward to the next outer or inner posts or runners. Building ties shall be installed at the bearer levels between the transverse bracing and shall conform to the requirements of 1926.451(c)(1).

1926.452(b)(3)

On straight run scaffolds, longitudinal bracing across the inner and outer rows of posts shall be installed diagonally in both directions, and shall extend from the base of the end posts upward to the top of the scaffold at approximately a 45 degree angle. On scaffolds whose length is greater than their height, such bracing shall be repeated beginning at least at every fifth post. On scaffolds whose length is less than their height, such bracing shall be installed from the base of the end posts upward to the opposite end posts, and then in alternating directions until reaching the top of the scaffold. Bracing shall be installed as close as possible to the intersection of the bearer and post or runner and post.

1926.452(b)(4)

Where conditions preclude the attachment of bracing to posts, bracing shall be attached to the runners as close to the post as possible.

1926.452(b)(5)

Bearers shall be installed transversely between posts, and when coupled to the posts, shall have the inboard coupler bear directly on the runner coupler. When the bearers are coupled to the runners, the couplers shall be as close to the posts as possible.

1926.452(b)(6)

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

..1926.452(b)(7)

1926.452(b)(7)

Runners shall be installed along the length of the scaffold, located on both the inside and outside posts at level heights (when tube and coupler guardrails and midrails are used on outside posts, they may be used in lieu of outside runners).

1926.452(b)(8)

Runners shall be interlocked on straight runs to form continuous lengths, and shall be coupled to each post. The bottom runners and bearers shall be located as close to the base as possible.

1926.452(b)(9)

Couplers shall be of a structural metal, such as drop-forged steel, malleable iron, or structural grade aluminum. The use of gray cast iron is prohibited.

1926.452(b)(10)

Tube and coupler scaffolds over 125 feet in height shall be designed by a registered professional engineer, and shall be constructed and loaded in accordance with such design. Non-mandatory Appendix A to this subpart contains examples of criteria that will enable an employer to comply with design and loading requirements for tube and coupler scaffolds under 125 feet in height.

1926.452(c)

Fabricated frame scaffolds (tubular welded frame scaffolds).

1926.452(c)(1)

When moving platforms to the next level, the existing platform shall be left undisturbed until the new end frames have been set in place and braced prior to receiving the new platforms.

1926.452(c)(2)

Frames and panels shall be braced by cross, horizontal, or diagonal braces, or combination thereof, which secure vertical members together laterally. The cross braces shall be of such length as will automatically square and align vertical members so that the erected scaffold is always plumb, level, and square. All brace connections shall be secured.

1926.452(c)(3)

Frames and panels shall be joined together vertically by coupling or stacking pins or equivalent means.

1926.452(c)(4)

Where uplift can occur which would displace scaffold end frames or panels, the frames or panels shall be locked together vertically by pins or equivalent means.

1926.452(c)(5)

Brackets used to support cantilevered loads shall:

1926.452(c)(5)(i)

Be seated with side-brackets parallel to the frames and end-brackets at 90 degrees to the frames;

1926.452(c)(5)(ii)

Not be bent or twisted from these positions; and

1926.452(c)(5)(iii)

Be used only to support personnel, unless the scaffold has been designed for other loads by a qualified engineer and built to withstand the tipping forces caused by those other loads being placed on the bracket-supported section of the scaffold.

1926.452(c)(6)

Scaffolds over 125 feet (38.0 m) in height above their base plates shall be designed by a registered professional engineer, and shall be constructed and loaded in accordance with such design.

1926.452(j)

Pump jack scaffolds

1926.452(j)(1)

Pump jack brackets, braces, and accessories shall be fabricated from metal plates and angles. Each pump jack bracket shall have two positive gripping mechanisms to prevent any failure or slippage.

1926.452(j)(2)

Poles shall be secured to the structure by rigid triangular bracing or equivalent at the bottom, top, and other points as necessary. When the pump jack has to pass bracing already installed, an additional brace shall be installed approximately 4 feet (1.2 m) above the brace to be passed, and shall be left in place until the pump jack has been moved and the original brace reinstalled.

..1926.452(j)(3)

1926.452(j)(3)

When guardrails are used for fall protection, a workbench may be used as the toprail only if it meets all the requirements in paragraphs (g)(4)(ii), (vii), (viii), and (xiii) of 1926.451.

1926.452(j)(4)

Work benches shall not be used as scaffold platforms.

1926.452(j)(5)

When poles are made of wood, the pole lumber shall be straight-grained, free of shakes, large loose or dead knots, and other defects which might impair strength.

1926.452(j)(6)

When wood poles are constructed of two continuous lengths, they shall be joined together with the seam parallel to the bracket.

1926.452(j)(7)

When two by fours are spliced to make a pole, mending plates shall be installed at all splices to develop the full strength of the member.

1926.452(k)

Ladder jack scaffolds

1926.452(k)(1)

Platforms shall not exceed a height of 20 feet (6.1 m).

1926.452(k)(2)

All ladders used to support ladder jack scaffolds shall meet the requirements of subpart X of this part -- Stairways and Ladders, except that job-made ladders shall not be used to support ladder jack scaffolds.

..1926.452(k)(3)

1926.452(k)(3)

The ladder jack shall be so designed and constructed that it will bear on the side rails and ladder rungs or on the ladder rungs alone. If bearing on rungs only, the bearing area shall include a length of at least 10 inches (25.4 cm) on each rung.

1926.452(k)(4)

Ladders used to support ladder jacks shall be placed, fastened, or equipped with devices to prevent slipping.

1926.452(k)(5)

Scaffold platforms shall not be bridged one to another.

1926.452(w)

Mobile scaffolds

1926.452(w)(1)

Scaffolds shall be braced by cross, horizontal, or diagonal braces, or combination thereof, to prevent racking or collapse of the scaffold and to secure vertical members together laterally so as to automatically square and align the vertical members. Scaffolds shall be plumb, level, and squared. All brace connections shall be secured.

1926.452(w)(1)(i)

Scaffolds constructed of tube and coupler components shall also comply with the requirements of paragraph (b) of this section;

1926.452(w)(1)(ii)

Scaffolds constructed of fabricated frame components shall also comply with the requirements of paragraph (c) of this section.

1926.452(w)(2)

Scaffold casters and wheels shall be locked with positive wheel and/or wheel and swivel locks, or equivalent means, to prevent movement of the scaffold while the scaffold is used in a stationary manner.

1926.452(w)(3)

Manual force used to move the scaffold shall be applied as close to the base as practicable, but not more than 5 feet (1.5 m) above the supporting surface.

..1926.452(w)(4)

1926.452(w)(4)

Power systems used to propel mobile scaffolds shall be designed for such use. Forklifts, trucks, similar motor vehicles or add-on motors shall not be used to propel scaffolds unless the scaffold is designed for such propulsion systems.

1926.452(w)(5)

Scaffolds shall be stabilized to prevent tipping during movement.

1926.452(w)(6)

Employees shall not be allowed to ride on scaffolds unless the following conditions exist:

1926.452(w)(6)(i)

The surface on which the scaffold is being moved is within 3 degrees of level, and free of pits, holes, and obstructions;

1926.452(w)(6)(ii)

The height to base width ratio of the scaffold during movement is two to one or less, unless the scaffold is designed and constructed to meet or exceed nationally recognized stability test requirements such as those listed in paragraph (x) of Appendix A to this subpart (ANSI/SIA A92.5 and A92.6);

1926.452(w)(6)(iii)

Outrigger frames, when used, are installed on both sides of the scaffold;

1926.452(w)(6)(iv)

When power systems are used, the propelling force is applied directly to the wheels, and does not produce a speed in excess of 1 foot per second (.3 mps); and

1926.452(w)(6)(v)

No employee is on any part of the scaffold which extends outward beyond the wheels, casters, or other supports.

..1926.452(w)(7)

1926.452(w)(7)

Platforms shall not extend outward beyond the base supports of the scaffold unless outrigger frames or equivalent devices are used to ensure stability.

1926.452(w)(8)

Where leveling of the scaffold is necessary, screw jacks or equivalent means shall be used.

1926.452(w)(9)

Caster stems and wheel stems shall be pinned or otherwise secured in scaffold legs or adjustment screws.

1926.452(w)(10)

Before a scaffold is moved, each employee on the scaffold shall be made aware of the move.

1926.454 TRAINING REQUIREMENTS

This section supplements and clarifies the requirements of 1926.21(b)(2) as these relate to the hazards of work on scaffolds.

1926.454(a)

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

1926.454(a)(1)

The nature of any electrical hazards, fall hazards and falling object hazards in the work area;

The correct procedures for dealing with electrical hazards

1926.454(a)(2)

The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used;

1926.454(a)(3)

The proper use of the scaffold, and the proper handling of materials on the scaffold;

1926.454(a)(4)

The maximum intended load and the load-carrying capacities of the scaffolds used; and

1926.454(a)(5)

Any other pertinent requirements of this subpart.

..1926.454(b)

1926.454(b)

The employer shall have each employee who is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold trained by a competent person to recognize any hazards associated with the work in question. The training shall include the following topics, as applicable:

1926.454(b)(1)

The nature of scaffold hazards;

1926.454(b)(2)

The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold in question;

1926.454(b)(3)

The design criteria, maximum intended load-carrying capacity and intended use of the scaffold;

1926.454(b)(4)

Any other pertinent requirements of this subpart.

1926.454(c)

When the employer has reason to believe that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, the employer shall retrain each such employee so that the requisite proficiency is regained. Retraining is required in at least the following situations:

1926.454(c)(1)

Where changes at the worksite present a hazard about which an employee has not been previously trained; or

..1926.454(c)(2)

1926.454(c)(2)

Where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained; or

1926.454(c)(3)

Where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.