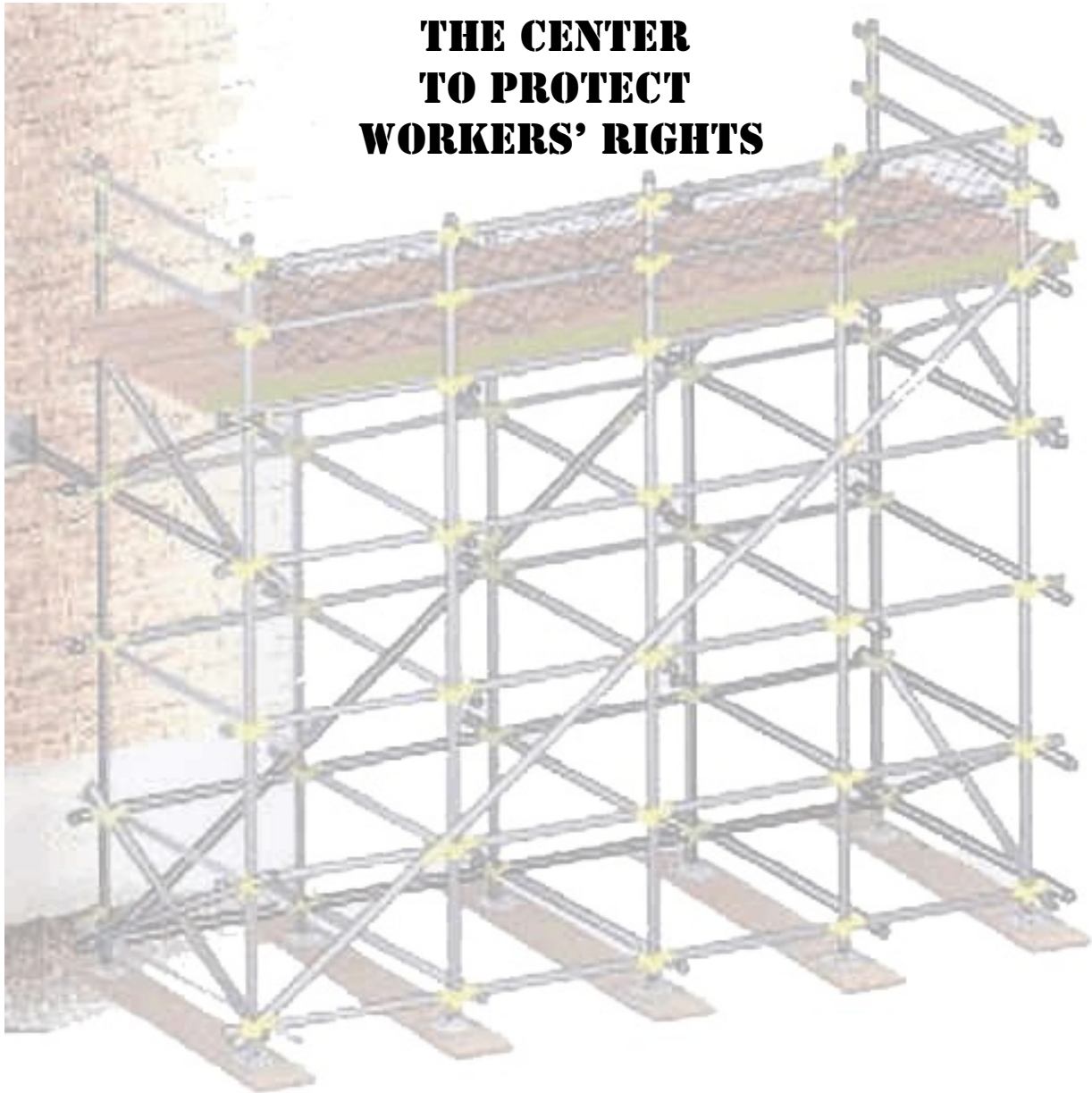
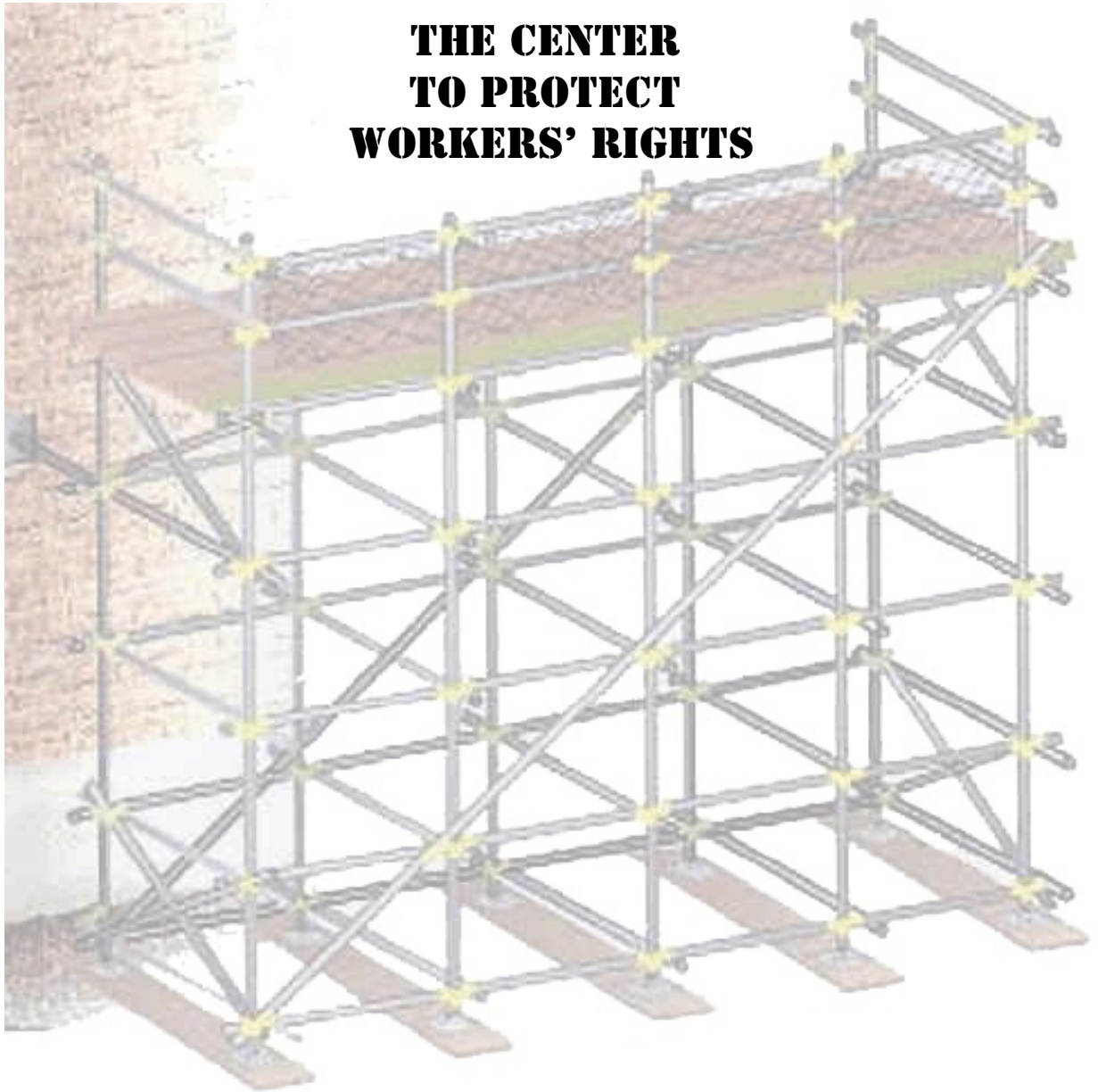


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2004**

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2004**

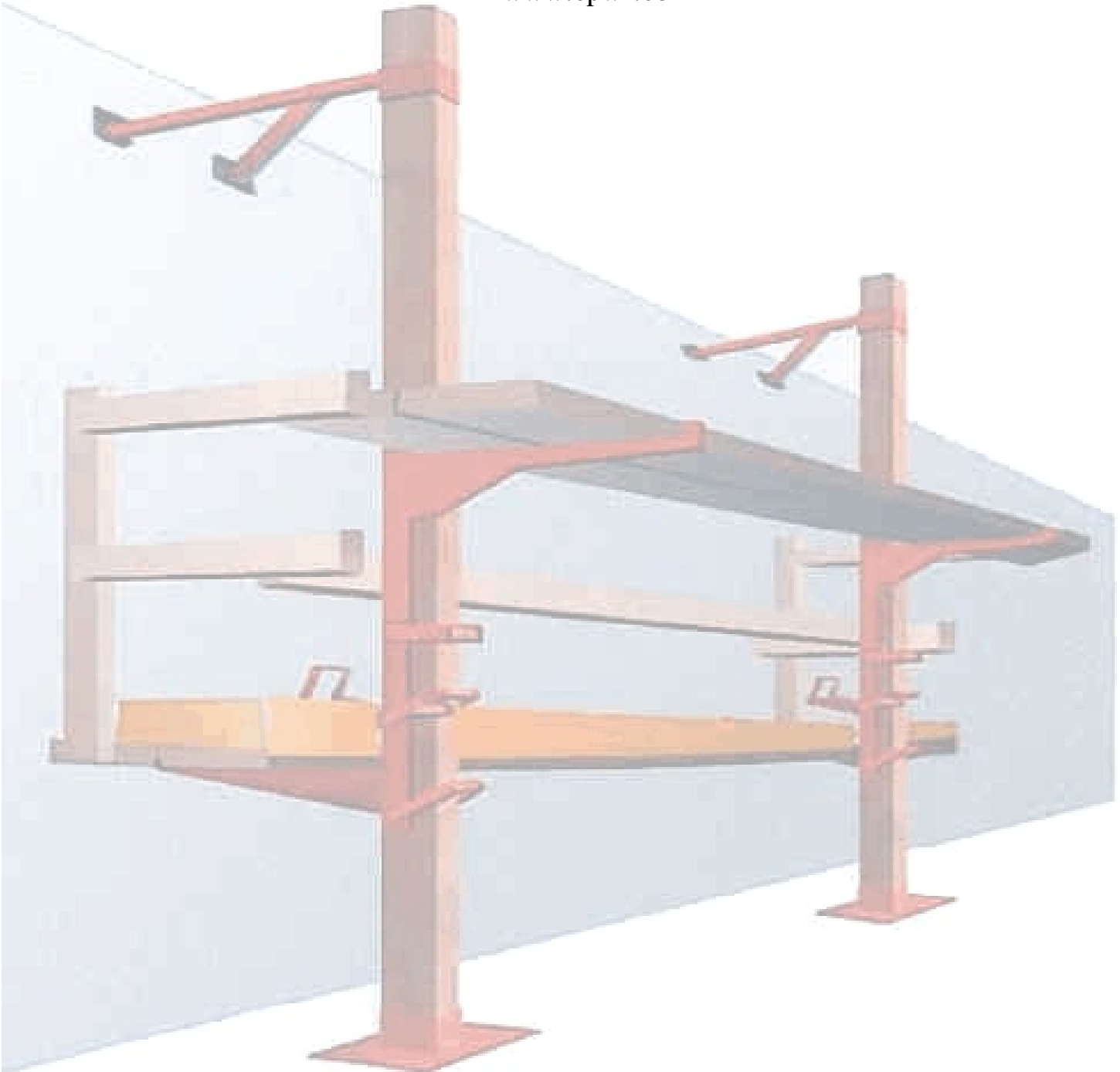
The Center To Protect Workers' Rights

8484 Georgia Ave., Suite 1000

Silver Spring, MD 20910

301-578-8500

www.cpwr.com



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September, 2004

INTRODUCTION

Scaffolding hazards continue to rank high on the list of the most frequently cited standards in the construction industry. Scaffold-related fatalities account for a significant number of fatalities in the construction workplace. Workers die while erecting scaffolds. They die when they dismantle them. And they die on scaffolds while doing their work.

This manual is for the “Scaffold Users” – the people who on any given day do their work from a supported or suspended scaffold. Maybe an aerial lift. The scaffolds are supposed to be erected and maintained properly and the aerial lifts are supposed to be operated safely. And Scaffold Users are supposed to be trained on how to access and work on a scaffold or aerial lift without injury – without death.

Scaffold User has been prepared as a classroom manual and as a reference later when you are working. *User* contains information to help you avoid becoming a victim of scaffolding hazards which includes falls, being struck by, and electrocution – just to name a few.

OSHA’s construction scaffold standards are in 1926 Subpart L and they are reprinted here. You will find an index to Subpart L to aid in your finding elusive references as well as a scaffold glossary to help you come to grips with some of the terms. And right up front are the scaffold user training requirements, a sample scaffold safety plan, and four Hazard Alerts on special topics. Scaffold safety starts with you. It starts before you climb on to the scaffold to earn you pay and your family’s livelihood. And it continues until the end of the day or job and you leave the scaffold and your work and head for home – only to reappear as you clock-in on the next shift. Work safe.

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SCAFFOLD USER TRAINING REQUIREMENTS

Why is scaffold safety important?

When OSHA revised its Scaffolds standard in 1996, Bureau of Labor Statistics studies showed that 25 percent of workers injured in scaffold accidents had received no scaffold safety training, and 77 percent of scaffolds were not equipped with guardrails.

OSHA estimated that informed employers and workers, in compliance with correct safety standards, would save as many as 50 lives and prevent 4,500 accidents every year.

What is a scaffold?

A scaffold is defined as an elevated, temporary work platform. There are three basic types of scaffolds:

- **Supported scaffolds**, which consist of one or more platforms supported by rigid, load-bearing members, such as poles, legs, frames, outriggers, etc.;
- **Suspended scaffolds**, which are one or more platforms suspended by ropes or other non-rigid, overhead support; and
- **Other scaffolds**, principally manlifts, personnel hoists, etc., which are sometimes thought of as vehicles or machinery, but can be regarded as another type of supported scaffold.



Common Hazards Associated with all Scaffolds

- Falls from elevation, due to lack of fall protection
- Collapse of the scaffold, caused by instability or overloading
- Being struck by falling tools, work materials, or debris and
- Electrocution, principally due to proximity of the scaffold to overhead power lines.

Who Uses Scaffolds?

Workers on scaffolds can be divided into two groups

- Erectors/Dismantlers
- Users (the focus of this manual)

Scaffold Users are those whose work requires them, at least some of the time, to be supported by scaffolding to access the area of a structure where that work is performed.

Training and Qualified Person Requirements

Employers are required by OSHA standards to have a qualified person provide training to each employee who performs work while on a scaffold. The training must enable employees to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards.

OSHA defines a qualified person as one who:
by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.
1926.450(b) "Definitions."



Scaffold User Training means that:

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;

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.

... [see pages 150 – 151 for the training language for erectors/dismantlers]

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)

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.

Scaffold "Use" means that:

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)

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: [deleted – see page 48 for details covering insulated and uninsulated lines]

OSHA defines a competent person as one who:

is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. **1926.450(b) "Definitions."**



COMPETENT PERSON SCAFFOLD INSPECTION CHECKLIST*

The *competent person* should use this checklist for daily inspections of the scaffold. It is not all-inclusive and should be used as a starting point for the *competent person* to develop a checklist specific to the type of scaffold and jobsite conditions encountered.

- Are scaffolds and scaffold components inspected before each work shift by a competent person?

- Have employees who erect, disassemble, move, operate, repair, maintain, or inspect the scaffold been trained by a competent person to recognize the hazards associated with this type of scaffold and the performance of their duties related to this scaffold?

- Have employees who use the scaffold been trained by a qualified person to recognize the hazards associated with this scaffold and know the performance of their duties relating to it?

- Is the maximum load capacity of this scaffold known and communicated to all employees?

- Is the load on the scaffold (including point loading) within the maximum load capacity of this particular scaffold?

- Is the scaffold plumb, square, and level?

- Is there safe access to all scaffold platforms?

- Are all working platforms fully planked?

- Do planks extend at least 6" and no more than 12" over the supports?

**Job Safety & Health Quarterly*. Spring, 1999.



Deaths from Aerial Lifts in Construction

Michael McCann

An average of 26 construction workers die each year from using aerial lifts. This is 2 to 3% of all construction deaths. On aerial lifts, the major causes are falls, electrocutions, and collapses or tipovers. For this article, aerial lifts include boom-supported aerial platforms, such as cherry pickers or bucket trucks, and elevating platforms, such as scissor lifts (OSHA regulates scissor lifts as mobile scaffolds, not aerial lifts). There are also 2 to 3 deaths each year from working on crane personnel platforms.

Electricians had the most deaths (25%), followed by construction laborers (15%), electrical power installers and repairers (13%), painters (8%), and carpenters (5%). These results do not show which trade is most at risk, because we don't know how many workers in the various trades use aerial lifts.

1. Causes of deaths in construction by type of aerial lift, United States, 1992-99

Cause	Boom-supported lifts	Scissor lifts	Unknown type of lift	Total
Electrocutions	62	6	–	69
Falls	35	23	6	64
Collapses or tipovers	23	21	–	46
Caught in/between	11	–	–	14
Struck by/against	6	–	–	9
Other causes	5	–	–	5
Total deaths	142	55	10	207

– fewer than 5 deaths

Note: Other causes include 6 fire deaths.

Source: U.S. Bureau of Labor Statistics data

Boom lifts accounted for almost 70% of the aerial lift deaths:

- Half of the falls from boom lifts involved being ejected from the bucket after being struck by vehicles, cranes, or crane loads, or by falling objects, or when a lift suddenly jerked.
- Two-thirds of the deaths from collapses/tipovers of boom lifts occurred when the bucket cable or boom broke or the bucket fell; almost one-third were due to tipovers.
- Half of the boom lift electrocutions involved body contact with overhead power lines, mostly involving electricians or electrical power installers and repairers. Over one-third of the electrocutions involved an overhead power line contacting the lift boom or bucket.
- In most of the caught in/between deaths, a worker was caught between the bucket edge and objects such as roof joists or beams while repositioning the bucket.

Michael McCann, PhD, CIH, is director of safety and ergonomics at the Center to Protect Workers' Rights, the research and development arm of the Building and Construction Trades Department, AFL-CIO.



Scissor lifts accounted for over 25% of the aerial lift deaths:

- The causes of scissor lift falls were unknown for over half of the fall deaths; in one-fifth of the falls, the worker was ejected from the scissor lift, mostly when the scissor lift was struck by an object. The rest of the fall deaths occurred after removal of chains or guardrails, or while standing on or leaning over railings.
- Three-quarters of the tipovers of scissor lifts resulted in fall deaths; for the rest, workers died from being struck by the falling scissor lift. About two-fifths of the tipovers occurred when the scissor lift was extended over 15 feet, mostly while driving the lift.

Recommendations

The Center to Protect Workers' Rights is continuing to do research on the safe operation of aerial lifts. In the meantime, here are some suggestions.

To prevent electrocutions:

- Non-electrical workers should stay at least 10 feet away from live overhead power lines.
- Avoid sudden jerks of buckets which can cause contact with live overhead power lines.
- According to OSHA, electrical workers working on or near live power lines must wear Class E (old Class B) insulated hard hats and voltage-rated shoes, rubber gloves, rubber sleeves, and other protective clothing as needed. Insulated tools must be used where necessary. If possible, de-energize or insulate live power lines. Boom buckets must be insulated or the aerial lift grounded. Insulated buckets must be tested regularly to ensure the insulation meets requirements.

For safe operation of aerial lifts, general OSHA requirements include:

- Qualified individuals must train aerial lift workers in the operation and limitations of each aerial lift they will be using.
- Do not modify an aerial lift without written permission of the manufacturer or other recognized entity.
- Boom lifts used for carrying people must have easily accessible controls in or beside the platform.
- Make sure aerial lifts are properly maintained. (This is particularly a concern with rented lifts.) Workers should inspect safety devices and check the operation of lift controls before using an aerial lift.
- Do not drive an aerial lift when the lift is extended, unless designed for that purpose.
- Set brakes and outriggers (if available). Use wheel chocks on slopes.
- Do not exceed weight or load limits.
- Stand on the floor of the lift platform; do not climb or sit on guardrails.
- For boom lifts, full-body harnesses are required although a safety belt with a 2-foot lanyard may be used instead. Tie off to the boom or basket, not nearby structures.
- For scissor lifts, fall protection is not required if there are guardrails.

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SCAFFOLD USER SAMPLE SCAFFOLD SAFETY PROGRAM

DATE: Now

SUBJECT: Sample Scaffolding Safety Program.

REGULATORY STANDARDS:

29 CFR 1910.28 Safety Requirements For Scaffolding.

29 CFR 1910.29 Manually Propelled Mobile Scaffolds.

29 CFR 1926 Subpart L Safety and Health Regulations for Construction

BASIS: Scaffolds are a major source of injuries and fatalities. Of the 510,500 injuries that occur in the construction industry annually, 9,750 are related to scaffolds. In addition, of the estimated 924 occupational fatalities occurring annually, at least 79 are associated with work on scaffolds. Most of these accidents can be prevented if proper safety precautions are initiated. This poses a serious problem for exposed workers and their employer. The OSHA Standards governing Scaffolding establish uniform requirements to ensure that the hazards existing in U.S. workplaces are evaluated, safety procedures implemented, and that the proper hazard information is transmitted to all affected workers.

GENERAL: Employees will ensure that all potential hazards regarding scaffolding at your job site are evaluated. This standard practice instruction is intended to address comprehensively the issues of; evaluating and identifying potential deficiencies, evaluating the associated potential hazards,



communicating information concerning these hazards, and establishing appropriate procedures, and protective measures for employees.

RESPONSIBILITY: The employer's designated competent person is normally responsible for all facets of this program and has full authority to make necessary decisions to ensure success of the program. The competent person is authorized to halt any operation where there is danger of serious personal injury.

Contents of the Scaffolding Safety Program (Sample)

- 1. Written Program.**
- 2. General Requirements.**
- 3. Manufacturers Recommendations for Safety.**
- 4. Universal Fixed Scaffolding Safety Policy.**
- 5. Universal Mobile (Rolling) Scaffolding Safety Policy.**
- 6. Erecting of Scaffolding.**
- 7. Pre-Inspection of Erected Scaffolding.**
- 8. Final Inspection of Erected Scaffolding.**
- 9. Dismantling of Scaffolding.**
- 10. Training.**

Scaffolding Safety Program

1. Written Program.

The Company will review and evaluate this standard practice instruction on an annual basis or when changes occur to the governing regulatory standards that prompt revision of this document, or when operational changes occur that require a revision of this document. Effective implementation requires a written program for job safety and health that is endorsed and advocated by the highest level of management within this Company and that outlines our goals and plans. This written program will be communicated to all required personnel. It is designed to establish clear goals and objectives.

2. General Requirements.

All facilities and equipment used will be maintained in a safe and healthful manner. Certain work conditions may contain a reasonable probability of injury that can be prevented by proper maintenance and supervision. The Job Site will do all things possible to ensure the safety of our employees. No



employee will knowingly be subjected to a hazardous condition without all possible protective measures first being implemented.

3. Manufacturers Recommendations for Safety.

To insure safety and serviceability the following general precautions concerning the care and use of all scaffolding will be observed.

4. Scaffolding Safety Policy.

To insure safety and serviceability, the following general precautions concerning the care and use of scaffolding will be observed:

- 4.1** Footing and Anchorages. The footing and or anchorage for scaffolds will be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks will not be used to support scaffolds or planks.
- 4.2** Scaffolds and their components will be capable of supporting without failure at least four times the maximum intended load.
- 4.3** Scaffolds will be maintained in a safe condition at all times in accordance with the manufacturers' recommendations. Fixed scaffolds will not be altered or moved horizontally while they are in use or occupied.
- 4.4** Any scaffold damaged or weakened from any cause will be immediately repaired and will not be used until repairs have been completed.
- 4.5** Scaffolds will not be loaded in excess of the working load for which they are intended.
- 4.6** All load-carrying timber members of scaffold framing will be a minimum of 1,500 f. (Stress Grade) construction grade lumber.
- 4.7** All planking will be Scaffold Grade as recognized by grading rules for the type of wood used. The scaffold manufacturers recommendations will be followed.
- 4.8** Nails or bolts used in the construction of scaffolds will be of adequate size and in sufficient numbers at each connection to develop the designed strength of the scaffold. Nails will not be subjected to a straight pull and will be driven full length.



- 4.9** All planking or platforms will be overlapped (minimum 12") or secured from movement.
- 4.10** An access scaffold or equivalent safe access will be provided.
- 4.11** Scaffold planks will extend over their end supports not less than 6" nor more than 18".
- 4.12** The poles, legs, or uprights of scaffolds will be plumb, square, and rigidly braced to prevent swaying and displacement.
- 4.13** Materials being hoisted onto a scaffold will have a tag line.
- 4.14** Overhead protection will be provided for workers on a scaffold exposed to overhead hazards.
- 4.15** Scaffolds will be provided with a screen between the toeboard and the guardrail, extending along the entire opening, consisting of No. 18 gauge U.S. standard wire $\frac{1}{2}$ " mesh or the equivalent, where persons are required to work or pass under the scaffolds.
- 4.16** Employees will not work on scaffolds which are covered with ice or snow unless all ice or snow is removed and planking sanded to prevent slipping.
- 4.17** Tools, materials, and debris will not be allowed to accumulate in quantities to cause a hazard.
- 4.18** Only treated or protected fiber rope will be used for or near any work involving the use of corrosive substances or chemicals.
- 4.19** Wire or fiber rope used for scaffold suspension will be capable of supporting at least six times the intended load.
- 4.20** The use of shore scaffolds or lean-to scaffolds will not be used by this Company.
- 4.21** Lumber sizes, when used in this section, refer to nominal sizes except where otherwise stated.
- 4.22** Scaffolds will be secured to permanent structures through use of anchor bolts, reveal bolts, or other equivalent means. Window cleaners' anchor bolts will not be used.
- 4.23** Special precautions will be taken to protect scaffold members, including any wire or fiber ropes, when using a heat-producing process.



5. Mobile (Rolling) Scaffolding Safety Policy.

To insure safety and serviceability, the following general precautions concerning the care and use of Scaffolding will be observed:

- 5.1 Working Loads. Depending upon the conditions of use, work platforms and scaffolds will be capable of carrying the design load under varying circumstances.
- 5.2 The design load of all scaffolds will be calculated on the basis of:
 - Light** - Designed and constructed to carry a working load of 25 pounds per square foot.
 - Medium** - Designed and constructed to carry a working load of 50 pounds per square foot.
 - Heavy** - Designed and constructed to carry a working load of 75 pounds per square foot.
- 5.3 Nails, bolts, or other fasteners used in the construction of ladders, scaffolds, and towers will be of adequate size and in sufficient numbers at each connection to develop the designed strength of the unit. Nails will be driven full length. (All nails should be immediately withdrawn from dismantled lumber.)
- 5.4 All exposed surfaces will be free from sharp edges, burrs, or other safety hazards.
- 5.5 Work Levels. The maximum work level height will not exceed four (4) times the minimum or least base dimensions of any mobile scaffold. Where the basic mobile unit does not meet this requirement, suitable outrigger frames will be employed to achieve this least base dimension, or provisions will be made to guy or brace the unit against tipping.
- 5.6 The minimum platform width for any work level will not be less than 20" for mobile scaffolds (towers). Ladder stands will have a minimum step width of 16".
- 5.7 Using adequate cross bracing or diagonal bracing with rigid platforms at each work level, the supporting structure for the work level will be rigidly braced.
- 5.8 The work level platform of scaffolds (towers) will be of wood, aluminum, or plywood planking, steel, or expanded metal for the full width of the scaffold, except for necessary openings. Work platforms will be secured in place. All planking will be 2" (nominal) scaffold



grade minimum 1,500 f. (stress grade) construction grade lumber or equivalent.

- 5.9** All scaffold work levels 10' or higher above the ground or floor will have a standard (4" nominal) toeboard.
- 5.10** All work levels 10' or higher above the ground or floor will have a guard rail of 2 x 4" nominal or the equivalent installed no less than 36" or more than 42" high, with a midrail, when required, of 1 x 4" nominal lumber or equivalent.
- 5.11** Wheels or Casters. Wheels or casters will be inspected to ensure that they are provided with strength and dimensions to support four (4) times the design working load.
- 5.12** All scaffold casters will be inspected to ensure that they are provided with a positive wheel and/or swivel lock to prevent movement.
- 5.13** Where leveling of the elevated work platform is required, screw jacks or other suitable means for adjusting the height will be used.
- 5.14** Employees are not permitted to ride rolling scaffolds during relocation.
- 5.15** Adjusting screws may not be extended more than 12".
- 5.16** Before moving the platform secure all equipment and material.
- 5.17** Casters or wheels must have a serviceable locking device.
- 5.18** Be aware of overhead obstructions when moving scaffolds.
- 5.19** Never run over electrical cords.
- 5.20** Never pull scaffolds from the top, always push at base level.
- 5.21** Work only from the platform area never extend work beyond guard railing.

6. Erecting of Scaffolding.

Only competent employees will supervise the erection of scaffolding. Pertinent OSHA regulations and information and guidance provided by the manufacturer of the particular type of scaffolding will be used. The following apply:

- 6.1** Manufacturers' erection instructions will be followed.
- 6.2** Advance planning considerations will be followed during the erection process.
- 6.3** Only competent employees will supervise the erection of scaffolding.
- 6.4** Each component will be visually inspected before use.
- 6.5** Defective or unserviceable materials will not be used.



- 6.6 Only approved lumber will be used.
- 6.7 Consult with the project manager where any instructions are unclear.

7. Pre-Inspection of Erected Scaffolding.

The three main areas of inspection are for rust, straightness of members, and welds. Only competent and qualified employees will conduct the pre-inspection. Pertinent OSHA regulations and information and guidance provided by the manufacturer of the particular type of scaffolding will be used. The following as a minimum apply:

- 7.1 Rust. Heavily rusted scaffolding equipment is a possible sign of abuse or neglect. Severely rusted components should be thoroughly inspected and cleaned before approved for use.
- 7.2 Straightness of Members. Mishandling, trucking, and storing may cause damage to scaffolding equipment. All members or parts of all steel scaffolding components should be straight and free from bends, kinks or dents.
- 7.3 Welds. Scaffolding equipment should be checked before use for damaged welds and any piece of equipment showing damaged welds or re-welding beyond the original factory weld should not be used. The factory weld reference pertains to location and quality of re-welds.
- 7.5 Check alignment of coupling pins and braces.
- 7.6 Check serviceability of caster brakes (rolling scaffolds).

8. Final Inspection of Erected Scaffolding.

Only competent employees will conduct the final inspection of erected scaffolding. Pertinent OSHA regulations and information and guidance provided by the manufacturer of the particular type of scaffolding will be used. The following as a minimum apply:

- 8.1 Check for proper support under every leg of every frame.
- 8.2 Check for wash out (if outside) due to rain.
- 8.3 Check to ensure all base plates or adjustment screws are in firm contact with supports.
- 8.4 Check frames for plumbness and squareness in both directions.
- 8.5 Check serviceability and correctness of all cross braces.



- 8.6 Check to ensure that all planking and accessories are properly installed.
- 8.7 Check to ensure that all guard rails are in place.
- 8.8 Recheck periodically to ensure conditions remain safe.

9. Dismantling of Scaffolding.

Only competent employees will supervise the dismantling of scaffolding. Pertinent OSHA regulations and information and guidance provided by the manufacturer of the particular type of scaffolding will be used. The following apply:

- 9.1 Manufacturers' dismantling instructions will be followed.
- 9.2 Relocation planning considerations will be considered during the dismantling process.
- 9.3 Dismantling will be supervised by a competent employee.
- 9.4 Each component will be visually inspected after use.
- 9.5 Defective or unserviceable materials will not stored with serviceable materials.
- 9.6 Avoid dropping or throwing the components as this could result in damage to the equipment.
- 9.7 Consult with the project manager where any instructions are unclear.

10. Training.

A training program will be provided for all employees who will be using scaffolding in the course of their duties. The training will be conducted by competent personnel. The program will include but will not be limited to:

- A description of fall hazards in the work area or job site;
- Procedures for using fall prevention and protection systems;
- Scaffolding access and egress procedures;
- Scaffolding equipment limitations; and
- Inspection and storage procedures for the equipment.

10.1 Initial Training. Training will be conducted prior to job assignment employer will provide training to ensure that the purpose, function, and proper use of scaffolding is understood by employees and that the knowledge and skills required for the safe application, and usage is



acquired by employees. This standard practice instruction will be provided to, and read by all employees receiving training. The training will include, as a minimum the following:

- 10.1.1 Types of scaffolding, including aerial lifts.
 - 10.1.2 Recognition of applicable fall hazards associated with the work to be completed and the locations of such.
 - 10.1.3 Load determination and balancing requirements.
 - 10.1.4 Safety precautions in the use of scaffolds.
 - 10.1.5 All other employees whose work operations are or may be in an area where scaffolding may be utilized, will be instructed to an awareness level concerning the associated hazards.
 - 10.1.6 Equipment maintenance and inspection requirements.
 - 10.1.7 Equipment strengths and limitations.
 - 10.1.8 **Certification.** Employer will certify that employee training has been accomplished and is being kept up to date. The certification will contain each employee's name and dates of training.
Training will be accomplished by competent personnel.
- 10.2 Refresher Training.** This standard practice instruction will be provided to, and read by all employees receiving refresher training. The training content will be identical to initial training. Refresher training will be conducted on an as needed basis or when the following conditions are met, whichever event occurs sooner.
- 10.2.1 Whenever (and prior to) a change in their job assignments, a change in the type of scaffolding equipment used, or when a known hazard is added to the work environment which affects this program.
 - 10.2.2 Additional retraining will also be conducted whenever a periodic inspection reveals, or whenever there is reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of scaffolding equipment or procedures.
 - 10.2.3 Whenever a scaffolding safety procedure fails.
 - 10.2.4 The retraining will reestablish employee proficiency and introduce new or revised methods and procedures, as necessary.
 - 10.2.5 **Certification.** Employer will certify that employee training has been accomplished and is being kept up to date. The certification



will contain each employee's name and dates of training.
Training will be accomplished by competent personnel.



Fatal Scaffold Falls – Missing Planks, Guardrails, and Proper Access

In the years from 1992-1998, there were 267 supported scaffold-related deaths, or 38 per year. Of this number, 217 deaths, or 81%, were falls while 47 deaths, or 18%, were falls stemming from a scaffold collapse. Another 15 workers died while dismantling scaffolds and 6 more died assembling them.

A recent evaluation of 113 supported scaffolds in the eastern United states yielded the following information which was presented in 2002 at an annual midwest construction safety conference:*

- 36 of the 113 scaffolds (32%) were unacceptable and posed imminent hazards, such as danger of collapse, missing planking, guardrails, and/or provided inadequate access.
- 77 scaffolds (63%) were acceptable and posed no imminent danger to workers.
- The number of fall hazards on the 36 unacceptable scaffolds included:
 - Missing mid guardrails 33
 - Missing top guardrails and midrails 28
 - Improper access
 - Climbing scaffold frame 23
 - Other severe access problems 5
 - Partially Planked Platforms 26
 - Substandard Planks 3
- Of the 36 unacceptable scaffolds:
 - 23 had both structural flaws as well as fall hazards

*Ken Halprin, PhD (consultant) and Michael McCann, PhD, CIH (Director of Safety and Ergonomics, Center To Protect Workers Rights). “An Evaluation of Supported Scaffold Safety”, presented at the 12th Annual Construction Safety Conference, Rosemont, IL, May 2002).



- 10 had fall hazards only
- 3 had structural flaws only
- Of the 36 unacceptable scaffolds:
 - 92% were missing guardrails
 - 83% had structural flaws
 - 78% had poor access
 - 72% were insufficiently planked
- Of the 113 scaffolds in the study:
 - 104 sites had workers present
 - 82 or 79% had competent persons
 - 10 sites (10%) said a competent person was not present
 - 72 competent persons were interviewed
 - Only 32 (44%) had been scaffold safety trained
 - 32 sites had competent persons who had scaffold training
 - 25 scaffolds (78%) were acceptable
 - 62 sites had no competent person or had one w/o scaffold safety training
 - 24 scaffolds (39%) were acceptable
 - 72 scaffolds were erected by scaffold users
 - 43 (60%) were acceptable
 - 41 scaffolds were erected by scaffold erection contractors
 - 34 (83%) were acceptable
 - 49 scaffolds were erected by union contractors
 - 38 (78%) were acceptable
 - 64 scaffolds were erected by non-union contractors
 - 39 (61%) were acceptable
 - 86/113 scaffolds (76%) were frame scaffolds
 - 54 frame scaffolds (63%) were acceptable
 - 27/113 scaffolds (24%) were other types of scaffolds
 - 23 scaffolds (85%) were acceptable

Summary of Proper Scaffold Practice – 1

- Unacceptable scaffolds have both:
 - Structural flaws
 - Missing or improperly supported base plates
 - Improper tying off to building
 - Uneven platform slope



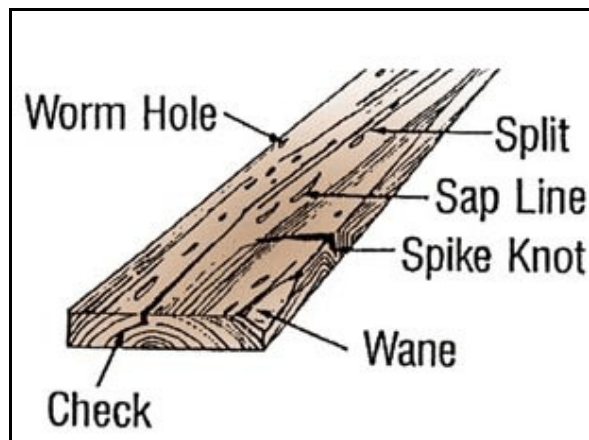
- Fall protection hazards:
 - Missing planking and/or guardrails
 - Inadequate access

Summary of Proper Scaffold Practice – 2

- Strong correlations with:
 - Presence of competent person with scaffold safety training
 - Use of non-frame scaffolds
 - Scaffold erected by scaffold erection company
- Slightly weaker correlation with union status of scaffold erector
- No correlation with:
 - Location
 - Site size
 - Number of workers on the scaffold
 - Trade of scaffold workers

Quick Scaffold Inspection Checklist

- ✓ Check for missing planks on platforms
- ✓ Check for missing guardrails
- ✓ Check for proper access
- ✓ Check for proper tying off to buildings
- **Note:** The first 3 points find 92% of unacceptable scaffolds



Plank defects that may lead to a fatal fall.



SCAFFOLD USER CPWR HAZARD ALERTS

**AERIAL LIFT SAFETY
FALL-PROTECTION HARNESS SAFETY
LOCKOUT/TAGOUT SAFETY
PORTABLE LADDER SAFETY
SCAFFOLD SAFETY**

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Aerial Lift Safety

Hazard Alert



About 26 construction workers die each year from using aerial lifts. More than half of the deaths involve boom-supported lifts, such as bucket trucks and cherry pickers; most of the other deaths involve scissor lifts. Electrocutions, falls, and tipovers cause most of the deaths. Other causes include being caught between the lift bucket or guardrail and object (such as steel beams or joists) and being struck by falling objects. (A worker can also be catapulted out of a bucket, if the boom or bucket is struck by something.) Most of the workers killed are electrical workers, laborers, painters, ironworkers, or carpenters.

Before Operating an Aerial Lift

Check operating and emergency controls, safety devices (such as, outriggers and guardrails), personal fall-protection gear, wheels and tires, and other items specified by the manufacturer. Look for possible leaks (air, hydraulic fluid, and fuel-system) and loose or missing parts.

Check where the lift will be used. Look for a level surface that won't shift. Check the slope of the ground or floor; do not work on steep slopes that exceed slope limits listed by the manufacturer. Look for hazards, such as, holes, drop-offs, bumps, and debris, and overhead power lines and other obstructions.

Set outriggers, brakes, and wheel chocks – even if you're working on a level slope.

Your employer should:

- Provide required manuals to operators and maintenance mechanics.
- Be sure operators and mechanics are trained by a qualified person experienced with the model of aerial lift.*

Using An Aerial Lift

- Always close lift platform chains or doors.
- Stand on the floor of the bucket or lift platform. **Do not** climb on or lean over guardrails.
- Do not exceed manufacturer's load-capacity limits (including the weight of such things as bucket liners and tools).
- If working near traffic, set up work-zone warnings, like cones and signs.

To prevent electrocutions:

- Non-electrical workers must stay at least 10 feet away from overhead power lines.
- Electrical workers must de-energize/insulate power lines or use proper personal protective equipment and tools.
- Insulated buckets protect from electrocution due to electric current passing through you and the boom to ground. The buckets do not protect if there's another path to ground – for instance, if you touch another wire.

To prevent falls:

On bucket trucks, OSHA requires a full-body harness and lanyard or a restraining device. To help keep workers inside guardrails, OSHA allows restraining devices with a 2 ft. lanyard.**

*OSHA says a *qualified person*...by extensive knowledge, training, and experience can...solve...problems related to the subject matter.... A *competent person* is...capable of identifying existing and predictable hazards...and has authorization to take prompt measures to eliminate them.



To prevent tipovers:

Check the manufacturer's instructions.

- Do not drive with the lift platform elevated (unless the manufacturer says that's OK).
- Do not exceed vertical or horizontal reach limits or the specified load-capacity of the lift.
- On an elevated scissor lift, avoid too much pushing or pulling.

Training

OSHA says a qualified person must train all users. The training must include:

- Any electrical, fall, and falling-object hazards.
- Procedures for dealing with hazards.
- How to operate the lift correctly (including maximum intended load and load capacity). The user must show he/she knows how to use the lift.
- Manufacturer requirements.

If the hazards change, the type of aerial lift changes, or a worker is not operating a lift properly, workers must be retrained.

Maintenance and Inspections

De-energize and lockout/tagout aerial lifts before any maintenance or repairs (*see* CPWR's hazard alert card, *Lockout/Tagout Safety*).

Each aerial lift must be inspected as the manufacturer requires – every 3 months or after 150 hours of use, whichever comes first. And the owner of a lift must do a detailed yearly inspection, as required by the manufacturer.

You Should Know

Many construction contractors rent aerial lifts instead of buying them. So you may not know which model you will be using, even though operator controls and other key features differ on each model. Also, you may not know the maintenance history of the lift.

The dealer or company renting out the lift should:

- Be sure the lift is properly inspected and serviced before rental.
- Provide operator and maintenance manuals.
- Make sure the operator controls are easy to reach and properly marked.

Your employer should:

- Be sure an aerial lift is not modified without written permission of the manufacturer.
- Be sure an aerial lift is used only under conditions approved by the manufacturer.
- Be sure proper personal fall-protection is provided and used.

For more information, call your local union, the Center to Protect Workers' Rights (CPWR) (301-578-8500 or www.cpwr.com), NIOSH (1-800-356-4674, or www.cdc.gov/niosh), or OSHA (1-800-321-OSHA or www.osha.gov) or go to www.elcosh.org.

**OSHA regulates other boom-supported lifts and scissor lifts as mobile scaffolds, and does not require personal fall-protection on them, if there are guardrails.

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Fall-Protection Harnesses

Hazard Alert



Falls kill more than 300 construction workers every year and hurt thousands. Deadly falls on the job are from unprotected roof edges, roof and floor openings, scaffolds, ladders, structural steel, leading edges, open shafts, and more.

Protect Yourself

Whenever fall protection is needed, make sure you have the right fall-protection system, know how it works, get trained to use it – and use it.

Where guardrails and safety nets won't work, you need personal protective equipment (PPE) – fall-restraint systems, personal fall-arrest systems, or work positioning systems (on rebar). Restraint systems keep you from falling. Fall-arrest systems stop falls. **You will need a full-body harness** if you use one of these systems.

A full-body harness has straps worn around your trunk and thighs, with one or more D-rings in back to attach the harness to other parts of the system. If you fall, a properly fitted harness spreads the stopping force over your thighs, pelvis, chest, and shoulders.

Choosing a Harness

- Learn about the types of fall hazards on your job.
- Choose the right type of fall protection for each type of fall hazard. **Never use a body belt, seat-only harness, or chest-only harness** for fall protection. Use a full-body harness instead.
- You can use a harness with an anchorage, a lanyard, a retractable lifeline, a vertical lifeline, a travel rail, a horizontal lifeline, a fall arrester, and/or a shock absorber. A fall-arrest system should let you fall no more than 6 feet. A work-positioning device should let you fall 2 feet or less.
- A registered professional engineer should design a fall protection system. A qualified person must supervise the setting up.**
- Make sure the harness fits you and is comfortable, to prevent body strain. You can get shoulder and back pads to reduce harness pressure. Full-body cross-chest harnesses are more comfortable for women and can reduce bruising when falls are stopped.

Training

- The employer must fit and train each worker for the equipment to be used.
- A competent person must train workers at risk of falling about types of fall hazards, how to protect yourself, and other hazards and limitations in using fall protection.** Training must cover all that can happen, like hanging in a harness and rescue. The trainer should tell workers about medical conditions that can be made worse by a fall in a harness.
- If the worksite changes or the type of fall protection equipment is changed, workers using the equipment must be retrained.

**OSHA says a *qualified person*...by extensive knowledge, training, and experience can...solve...problems related to the subject matter.... A *competent person* is...capable of identifying existing and predictable hazards...and has authorization to take prompt measures to eliminate them.



Using a Harness

Follow manufacturers' instructions for wearing harnesses. Your employer must keep these instructions so you can see them when you ask. For most full-body harnesses, every time you use one, do this:

- Carefully look over the harness.
- Hold the harness by the back D-ring and shake it so all straps fall in place.
- Slip the straps over your shoulders so the D-ring is in the middle of your back.
- Connect the chest and/or waist straps. These straps should fit snug.
- Reach between your legs and connect one long strap to the buckle or closure on your thigh. Repeat with the second strap.
- After you connect both straps, pull them tight. The harness should be snug but let you move freely.
- Connect the harness to the right fall-protection system.
- Make sure your anchor point is approved for the way you will use it. If you are not sure, check with the competent person for the job.
- Never use gear that has already been in a fall, unless it has been recertified by the manufacturer.

Rescue

Workers who fall in a harness may not be able to rescue themselves. So set up a rescue plan for each possible fall situation. Make sure ladder trucks will be able to reach hanging workers. Or plan ahead for other ways to rescue them. Be sure medical and rescue teams will get there fast, if needed. This is because hanging in a harness for a long time can endanger you. And a worker who falls may have other injuries.

Inspections

- Inspect your equipment before each use. A competent person should inspect it at least once each year.
- Follow all manufacturer instructions about inspecting, caring for, and storing the equipment.
- After inspecting your equipment as the manufacturer says, inspect it for:
 - Missing or unreadable markings or warnings
 - Missing parts
 - Damage to **metal parts** – any changes, cracks, sharp edges, distortion, corrosion, chemical damage, too much heating, or too much wear
 - Defects in or damage to **straps or ropes** – any changes, fraying, unsplicing, unlaying, kinking, knotting, roping, broken or pulled stitches, abrasion, excessive oiling, or sections that are too old, too worn, or too dirty
 - Missing parts or signs of defects in or damage to – or improper working of – **mechanical parts and connectors**.
- If equipment looks as if it needs repair – or it is time for maintenance – tag it, “**Do not use,**” and remove it from service.

Maintenance and Storage

To help keep you safe, fall-protection equipment must be stored the right way.

- The employer should maintain and store the equipment, according to the manufacturer's instructions.
- Store equipment away from heat, light, dampness, oil, chemicals, or other damaging conditions.
- Hang each harness by the back D-ring to help keep the shape when not in use.
- Take special questions, which may arise because of job conditions, to the employer.

For more information, call your local union, the Center to Protect Workers' Rights (CPWR) (301-578-8500 or www.cpwr.com), the National Institute for Occupational Safety and Health (1-800-35-NIOSH or www.cdc.gov/niosh), or OSHA (1-800-321-OSHA or www.osha.gov). Or check the website www.elcosh.org

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12/9/03



Lockout/Tagout Safety Hazard Alert



Dozens of construction workers are killed and more are injured every year because they did not de-energize and lock out equipment before working on it. Most of the deaths are electrocutions, but workers sometimes are crushed or have amputations or other injuries. These types of energy need to be controlled: electric, hydraulic, pneumatic, mechanical, heat, and pressurized liquids, vapors, and gases.

Protect Yourself

Lockout/tagout is a way to make sure electricity or other energy is not turned on (or released) while someone is working on machinery. **Turning off a power switch is not enough.** You must **de-energize** (prevent equipment from starting or moving), **lock it out**, release stored energy (for instance, bleed air from a pneumatic hose), and **test to make sure the energy is off.**

Your employer should:

- Set up a written lockout/tagout program
- Train you to use the program.*

The program should cover:

- Planning to identify:
 - energy sources
 - workers who can get hurt
 - who will de-energize equipment (and how).
- Keeping track of all involved workers
- Telling workers on new shifts about the lockout/tagout job
- Making sure the equipment is de-energized so it cannot be restarted
- Setting and removing lockout/tagout devices
- Coordinating with other jobs under way
- Releasing stored energy (for instance, discharging capacitors)
- Returning equipment to service (including testing or positioning of equipment).

Lockout/Tagout Procedure

1. **Notification.** Tell equipment operators and supervisors that power is being disconnected or isolated.
2. **Preparation.** Check with your supervisor for a written procedure (or checklist) that tells how to shut down and restart the equipment you are working on.
3. **Shutdown.** Turn off the equipment.
4. **Isolation.** Separate all energy sources using proper isolating devices – like manual circuit breakers or disconnect switches. Pushbuttons or selector switches cannot be the only way to de-energize. A lot of equipment has more than one type of energy that needs to be isolated.
5. **Lockout/tagout application.** Every worker who can be exposed to hazardous energy must be part of the lockout/tagout process.

*OSHA has a comprehensive standard for lockout/tagout for general industry (29CFR1910.147), but not for construction.



- A **lockout device** is a key or combination lock with a special tag with a worker's name. The lock must be attached to an isolating device, circuit breaker, and/or switch to prevent turning on the energy source or equipment or releasing energy.
- A **tagout device** is a tag and a way to attach it that can withstand at least 50 pounds of force. (Some tagout devices are attached with wire.) Use a tagout device only when you cannot lock out. The tag should have a label or sign that says no one can turn on the equipment or remove the energy-isolating device without permission. (OSHA allows tagout devices, but the National Institute for Occupational Safety and Health, NIOSH, does not recommend tagout-only work.)
- Each worker at risk should apply an individual lockout/tagout device to each source of hazardous energy – so there may be many locks or tags on each device. You must be the only one who has the key or combination for a lockout device you install – except in complex lockout/tagout (read below).

Individual qualified employee control. For minor servicing, maintenance, or inspection of plug-and-cord equipment, you may work without attaching lockout/tagout devices if you unplug the equipment and you always work next to the power plug and control the plug.

Complex lockout/tagout. A special written plan is needed when a job has more than one of any of these:

- Energy source
- Crew
- Craft
- Location
- Employer
- Way to isolate energy, or
- Work shift.

One crew member should be in charge of the whole lockout/tagout. This person should be trained and identified by name in the written plan. Each worker still should check to be sure all energy sources are locked out before starting work.

6. **Control of stored energy.** Release energy by discharging capacitors, removing jacks or chock blocks, or draining hydraulic lines, for instance.

7. **Verification.** Use testing equipment (such as an electric circuit tester) to make sure equipment has been de-energized.

8. **Removal of lockout/tagout devices.** Only the worker who puts on a lockout or tagout device should take it off. If someone else must take off the device, he/she must be sure that the person who installed it is not on the site, and must warn that employee when he/she returns.

9. **Return to service.** When the work is done and lockout/tagout devices are off, you must **test** and **look** to be sure all tools, mechanical restraints, and electrical devices have been removed before you turn on power. Before you re-energize, you must warn all workers who can operate the equipment and make sure no one else is near it.

10. **Temporary release.** If the job requiring lockout/tagout is interrupted for testing or positioning equipment, the procedures must start all over.

For more information, call your local union, the Center to Protect Workers' Rights (CPWR) (301-578-8500 or www.cpwr.com), NIOSH (1-800-35-NIOSH or www.cdc.gov/niosh), or OSHA (1-800-321-OSHA or www.osha.gov) or go to www.elcosh.org.

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Portable Ladder Safety

Hazard Alert



Each year, about 50 construction workers are killed by falls from ladders. More than half of the deaths occur to people working from ladders. Twice as many falls occur stepping down compared to going up ladders. The main cause of falls from straight and extension ladders is sliding of the ladder base. For self-supported ladders or stepladders, the main cause is tipping sideways. A lot of workers carrying ladders hurt their backs, too.

Protect Yourself

- Choose the right equipment. Use ladders mainly for climbing to or from upper levels. Scaffolds or scissor lifts are safer to work from than ladders.
- Choose the right ladder length.
- A sticker on a commercial ladder tells you its maximum weight capacity. Use only type I, IA, or IAA ladders, which can support 250, 300, and 375 pounds, respectively. OSHA says job-made portable ladders must be tested for strength; a regular ladder must be able to hold at least 4 times its maximum weight capacity.
- Ladder rungs, cleats, and steps must be parallel, level, and evenly spaced (for most ladders, the spacing must be 10 to 14 inches). The rungs and steps of metal ladders must be grooved or roughened to minimize slipping. Side rails must be at least 11.5 inches apart.
- Do not tie ladders together.
- If you use two or more ladders to reach one spot, they must have a platform or landing between them.
- Ladder parts must be smooth to prevent punctures or cuts or snagging of clothing.
- Wood ladders must not be painted with a coating that can hide defects.
- Employees must be trained in ladder use. A competent person must train employees in site-specific ladder safety.*

Setting up a Ladder

- Use 2 people to carry and set up a ladder, if possible.
- Keep all types of ladders (and tools) at least 10 feet away from live overhead power lines and other overhead obstructions. Aluminum and even wet or dirty wood or fiberglass ladders can conduct electricity.
- Set a ladder on firm, level ground. Use ladder levelers on uneven ground. Secure the ladder – tie it down, use slip-resistant feet, or have someone hold it in place. (A ladder on a slippery surface must be tied in place or held.)
- Keep the area around the top and bottom of a ladder clear. In passageways, doorways, or where traffic or other activities can occur, secure the ladder or block off the area.
- Do not set a ladder on a scaffold, box, or other object.
- **Stepladders:** All four legs must be on solid, level ground. The spreaders must be locked fully open. Never climb on the cross-bracing. Never lean a stepladder against a wall.
- **Straight and extension ladders:** The ladder base should be 1 foot from the building (or top support, such as an eave) for every 4 feet of ladder length up to the resting position. Counting rungs will give you a good estimate of the ladder length; rungs are about 1 foot apart.

(Please turn the page.)

* OSHA says a *competent person* is...capable of identifying existing and predictable hazards...and has authorization to take prompt measures to eliminate them. More information on ladder safety is in the OSHA Construction Standards in the *Code of Federal Regulations*, CFR 1926.1050-1060 (Subpart X).



- After you set up an extension ladder, lock the top section in place. Extension ladder sections must overlap -- by at least 3 feet for ladders up to 32 feet, by 4 feet for ladders 32 feet to 48 feet, and by 5 feet for ladders 48 feet to 60 feet.
- Both rails must rest evenly on the resting spot, unless the ladder has a single-support attachment.
- When a ladder is used to get on or off a roof, secure the ladder by tying. The side rails should be at least 42 inches above the roof to be safe. Job-made ladders should let you get on or off a ladder by stepping between the rails. If you have to step around a ladder because of rungs, there should be a grab rail attached to the building to help you. (OSHA requires the grab rail and tie-off if a ladder doesn't extend at least 36 inches above the roof.) If there is a high parapet wall, use a stairway or some other way to get on or off the parapet.

Using a Ladder

- Always check a ladder before you use it; recheck it if it has been unattended.
- Always face a ladder when working on it – or moving up or down.
- Wear shoes with slip-resistant soles.
- Always have 3-point contact (such as, one hand and two feet).
- Do not work from the top or top step of a stepladder, or from any of the top 3 steps of a straight or extension ladder.
- Keep your body centered between the side rails of the ladder – so you don't tip over the ladder.
- If possible, use a personal fall arrest system attached to a secure anchor point on a building when working from a ladder.
- Do not hold objects in your hand when moving up or down or stepping on/off a ladder to an upper level. Attach objects to your tool belt or pull them up on a line after you get to your work spot.
- Do not use a ladder when it is windy.
- Never move a ladder while someone is on it. Lower the top section of an extension ladder before you move it.

Inspecting a Ladder

OSHA says a ladder must be inspected regularly for visible defects by a competent person and after any incident that could affect its safe use. Check your ladder for damage before each use. If a ladder is damaged, label it, **Do not use**, and take it away until it is fixed. Destroy it if it can't be fixed.

Here is a checklist for inspecting ladders:

- Make sure the feet work and are not broken – and slip-resistant pads on the feet are secure.
- Inspect ladder parts for cracks, bends, splits, or corrosion.
- Check all rung and step connections.
- Make sure rung locks and spreader braces are working.
- On extension ladders, make sure the rope and pulley work and the rope is not frayed.
- All bolts and rivets should be secure.
- All rung locks and other movable parts should be oiled or greased.
- Make sure the steps, rungs and other ladder parts are free of oil, grease, and other materials.

For more information, call your local union, the Center to Protect Workers' Rights (CPWR) (301-578-8500 or www.cpwr.com), the National Institute for Occupational Safety and Health (1-800-35-NIOSH or www.cdc.gov/niosh), or OSHA (1-800-321-OSHA or www.osha.gov). Or go to www.elcosh.org

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12/9/03



Scaffold Safety

Hazard Alert



The Hazards

Each year, more than 60 workers are killed by falls from scaffolds, about 1 in 5 of the fatal falls in construction. Besides problems with planks and guardrails, the main causes of injuries and deaths on scaffolds are poor planning for assembling and taking them apart, missing tie-ins or bracing, loads that are too heavy, and being too close to power lines. Also, falling objects can hurt people below scaffolds.

Protect Yourself

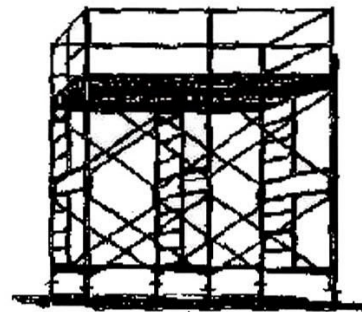
Scaffolds are supported (usually by posts/beams and legs) or suspended (by ropes).

- OSHA says a scaffold must be designed by a qualified person.* Supported scaffolds must be able to support their own weight and at least 4 times the maximum intended load .
- OSHA says a competent person* must inspect a scaffold before each workshift and after anything happens that could affect the structure. The competent person should be trained in scaffold safety.
- A competent person must supervise if a scaffold is assembled, changed, moved, or taken apart.
- **Power lines:** Keep scaffolds 10 feet or more from power lines (or 3 feet, if lines are less than 300 volts), unless you are sure the power lines are de-energized.
- **Weather:** You cannot work on a scaffold in high winds or a storm unless a competent person says it is safe and you use personal fall-arrest or a windscreen. (If you use a screen, the scaffold must be secured against the expected wind force.) OSHA says you must not work on a scaffold that has ice or snow on it — except to get ice or snow off the scaffold.

Guidelines for checking a scaffold

- If a scaffold is more than 2 feet above or below a level, there must be a way to get on or off — such as a ladder, ramp, or personnel hoist. The way to get on or off must not be more than 14" away from the scaffold.
- Put a standing scaffold on a firm foundation (with base plates attached to feet)— for instance, with one piece of wood under each pair of legs (across the shortest distance), extending at least 1 foot past each leg.
- Uprights must be vertical and braced to prevent swaying; platforms must be level.
- A scaffold that is more than 4 times higher than its base is wide must be tied to supports.
- Most scaffold platforms and walkways must be 18" wide or more. If a work area is less than 18" wide, guardrails and/or personal fall-arrest must be used.
- Ten-foot planks must extend at least 6" past the end supports, but not more than 12"; no more than 1" between planks or between planks and uprights.
- Wood planks must be unpainted, so any cracks will show.

(Please turn the page.)



* OSHA says a *qualified person*...by extensive knowledge, training, and experience can...solve...problems related to the subject matter.... A *competent person* is...capable of identifying existing and predictable hazards...and has authorization to take prompt measures to eliminate them. More information on scaffold safety is in the OSHA Construction Standards in the *Code of Federal Regulations*, CFR 1926.450-454.



Suspended scaffolds

- Supporting outrigger beams must be able to support 4 times the intended load. To keep a scaffold from falling to the ground, it must be attached to the roof, tied to a secure anchorage, or secured with counterweights. The suspension ropes and rigging must support at least 6 times the intended load.
 - Counterweights must be attached to secure and strong places on a building so they won't move. Do not use bags of sand or gravel, masonry blocks, or roofing materials that can flow or move.
 - Do not use gas-powered equipment or hoists. A hoist must have an automatic brake for emergencies.
- * A 1-point or 2-point suspended scaffold must be tied or secured to prevent swaying.

Fall protection

- OSHA says if a scaffold is more than 10 feet above a level, workers must have fall protection.
- A competent person must decide if fall protection is feasible when you assemble a scaffold or take it apart.
- On most scaffolds, guard rails must be on all open sides and ends. On supported scaffolds and some other scaffolds, guardrails or personal fall protection is enough. On most suspension scaffolds, both are needed. Use a harness, not a body belt for personal fall protection.
- You do not need a guard rail on the working side when the platform is less than 14" from the work (18" for plastering and lathing). The open side of an outrigger must never be more than 3" from the face of the building.
- On supported scaffolds most of the time, the top rail must be 38" to 45" above the platform. A top rail must be strong enough to hold 200 lb. (or 100 lb. on single-point and two-point suspension scaffolds). A mid-rail must be about halfway between the platform and the top rail; most mid-rails must be able to hold 150 pounds. If mesh, screens, or panels are used, a top rail is needed (unless mesh was designed and installed to meet guardrail requirements).
- Scaffold walkways must have no more than a 9.5" gap between planks and a guardrail.
- Don't let junk collect on the scaffold. You can trip and fall.

Protection for people below a scaffold

There must be a 3½"-high toe board to prevent things falling off a scaffold. If things on the scaffold are taller than 3½" — above the toeboard — other systems, like debris nets, can be used to catch falling tools or materials. If things can fall off a scaffold, people must be prevented from walking under or near the scaffold.

Training

- The employer must have a qualified person provide safety training for each worker who *uses* a scaffold. A competent person must give safety training to any worker who assembles, takes apart, moves, operates, repairs, maintains, or inspects scaffolds.
- If the worksite changes or the type of scaffold or safety equipment changes, workers using scaffolds must be retrained.

For more information, call your local union, the Center to Protect Workers' Rights (CPWR) (301-578-8500 or www.cpwr.com), the National Institute for Occupational Safety and Health (1-800-35-NIOSH, 1-800-356-4674, or www.cdc.gov/niosh), or OSHA (1-800-321-OSHA or www.osha.gov). Or go to the website www.elcosh.org

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August 2002



NOTES & SCRIBBLES



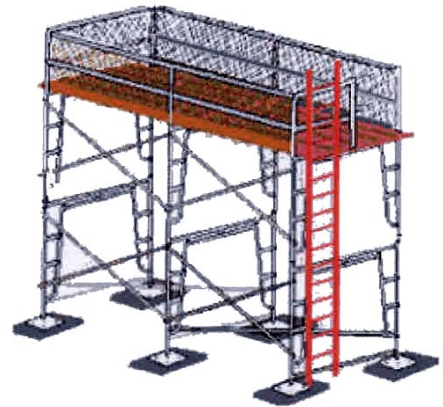


SCAFFOLD USER SUPPORTED SCAFFOLDS

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

FRAME SCAFFOLD

Fabricated frame scaffolds are the most common type of scaffold because they are versatile, economical, and easy to use. They are frequently used in one or two tiers by residential contractors, painters, etc., but their modular frames can also be stacked several stories (bucks) high for use on large-scale construction jobs.



Sources: *A Guide to Scaffold Use in the Construction Industry*. U.S. Department of Labor. OSHA Publication 3150, revised. Small Business Safety Management Series. 173 pp. 2002. Downloaded as a PDF file 9/13/04 from <http://www.osha.gov/pls/publications/pubindex.list> and *Construction eTool*, “Scaffolding”, U.S. Department of Labor OSHA website. <http://www.OSHA.gov/SLTC/etools/scaffolding/supported/index.html>.



Base Section

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



Firm Foundation. In order to assure stability, supported scaffolds must be set on base plates, mud sills, or other adequate firm foundation, unlike the example pictured at the left which has no base plates and is on an uneven surface [1926.451(c)(2) – hereafter referred to as “.451”. Footings must be capable of supporting the loaded scaffold without settling or displacement [.451(c)(2)(i)]. Unstable objects must not be used to support scaffolds or platform unit [.451(c)(2)(ii)]. 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 [.451.(c)(2)(iv)]. Forklifts shall not be used to support scaffold platforms unless the entire platform is attached to the fork and the forklift is not moved horizontally

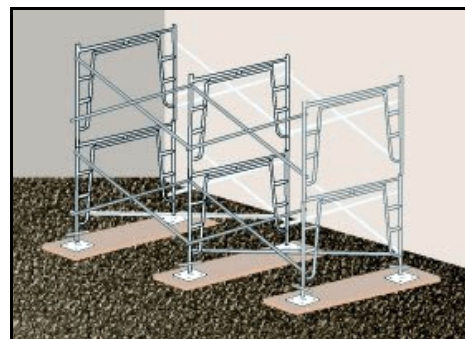
while the platform is occupied [.451(c)(2)(v)].

Plumb. Supported scaffold poles, frames, uprights, etc. must be plumb and braced to prevent swaying and displacement. In general, a level is the easiest way to achieve the desired right angles [.451(c)(3)].

Support Structure

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

Capacity. Scaffolds and scaffolding components must be capable of supporting, without failure, their own weight and at least 4 (four) times their maximum intended load [.451(a)]. **TIP:** A scaffold can be overloaded by removing the braces, which causes the weight on the scaffold to be distributed to fewer structural members. Even if they are “in the way,” braces should not be removed while work is being performed on a scaffold.





Bracing. Frames and panels must be connected by cross, horizontal, or diagonal braces, alone or in combination, which secure vertical members together laterally [1926.452(c)(2)] – hereafter referred to as “.452”. As frames are stacked, cross braces must be of such length as will automatically keep the scaffold plumb, level, and square [.452(c)(2)]. All brace connections must be secured to prevent dislodging [.452(c)(2)], unlike the use of wire pictured to the left. *TIP:* A level may be used frequently during assembly to guarantee that new structural components remain inline.



Pinning. Frames and panels must be joined together vertically by coupling or stacking pins or equivalent means [.452(c)(3)]. Frames and panels must be locked together to prevent uplift, where uplift can occur. Uplift is the separation of a frame from the frame below it [.452(c)(4)]. *TIP:* Separation of frames can occur in high winds (uplift), or when workers climb end frames, overload the platform, or strike the scaffold with tools, materials, etc.

Components. Scaffold components manufactured by different manufacturers must not be intermixed, unless they fit together without being forced and the scaffold’s structural integrity is maintained [.451(b)(10)]. Scaffold components manufactured by different manufacturers are not allowed to be modified to make them fit together unless a competent person determines that the resulting scaffold is structurally sound [.451(b)(10)]. Scaffold components made of dissimilar metals must not be used together unless a competent person has determined that galvanic action will not reduce the strength of any component below OSHA standards [.451(b)(11)].

Access

Workers are most vulnerable to fall hazards when climbing on or off a scaffold; therefore, employers are required to provide safe scaffold access. Erectors and dismantlers face additional access problems due to the incomplete conditions of the scaffolding.

General. Employees must be able to safely access any level of a scaffold that is 2' above or below an access point [.451(e)(1)]. OSHA standards specifically forbid climbing crossbraces as a means of access [.451(e)(1)].





Ladders. Portable, hook-on, and attachable ladders must not be positioned so as to tip the scaffold [.4451(e)(2)]. Hook-on and attachable ladders must be specifically designed for use with the type of scaffold on which they are used [.451(e)(2)(iv)].

Hook-on and attachable ladder rungs shall:

- Be positioned so that the bottom rung is not more than 24" above the scaffold supporting level [.451(e)(2)(ii)].
- Have uniform spacing between rungs of a maximum $16\frac{3}{4}$ " [.451(e)(2)(vi)].
- Have minimum rung length of $11\frac{1}{2}$ " [.451(e)(2)(v)].
- Have rest platforms provided at a maximum of 35' vertical intervals [.451(e)(2)(iii)].

Stairway-type ladders shall:

- Be positioned so that their bottom step is not more than 24" above the scaffolding supporting level [.451(e)(3)(i)].
- Have rest platforms at maximum vertical intervals of 12' [.451(e)(3)(ii)].
- Have a minimum step width of 16", except for mobile scaffold stairway-type ladders, which shall have a minimum step width of $11\frac{1}{2}$ " [.451(e)(3)(iii)].
- Have step-resistant treads on all steps and landings [.451(e)(3)(iv)].

Steps and rungs of ladders and stairway-type ladders shall line up vertically with each other between rest platforms [.451(e)(7)].

Integral (Built-in Access). Integral (built-in) scaffold access frames must:

- Be specifically designed and constructed for use as ladder rungs [.451(e)(6)(i)].
- Not be used as work platforms when rungs are less than $11\frac{1}{2}$ " in length, unless each affected employee uses appropriate fall protection [.451(e)(6)(iii)].
- Have rungs which are uniformly spaced and a length of at least 8", with a maximum space between rungs of $16\frac{3}{4}$ " [.451(e)(6)(ii),(iii),(iv) and .451(e)(2)(vi)].



- Have rest platforms provided as a maximum of 35' vertical intervals **[.451(e)(6)(v)]**.

Stair towers (scaffold stairway/towers) must have:

- A stair rail consisting of a toprail and a midrail on each side of the stairway **[.451(e)(4)(i)]**.
- A toprail of each stair rail system capable of serving as a handrail, unless a separate handrail is provided **[.451(e)(4)(ii)]**.
- Sufficient handhold on handrails and toprails serving as handrails, for employees grasping them to avoid falling **[.451(e)(4)(iii)]**.
- Stair rails and handrails surfaced to prevent punctures or lacerations to employees, and to prevent snagging of clothing **[.451(e)(4)(iv)]**.
- Ends of stair rails and handrails constructed so that they do not constitute a projection hazard **[.451(e)(4)(v)]**.
- A space of at least 3" between handrails, or stair rails used as handrails, and other objects **[.451(e)(4)(vi)]**.
- A distance no less than 28" and no more than 37" from the upper surface of the stair rail to the forward edge of the tread, in line with the face of the riser **[.451(e)(4)(vii)]**.
- A landing platform at least 18" wide by 18" long at each level **[.451(e)(4)(viii)]**.
- A scaffold stairway width of at least 18" between stair rails **[.451(e)(4)(x)]**.
- Slip-resistant surfaces on treads and landings **[.451(e)(4)(x)]**.
- Stairways installed between 40° and 60° from the horizontal **[.451(e)(4)(xi)]**.
- Guardrails meeting OSHA requirements **[.451(g)(4)]** on the open sides and ends of each landing **[.451(e)(4)(xii)]**.
- Uniform riser height, with $\frac{1}{4}$ " variation, 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) **[.451(e)(4)(xiii)]**.
- Uniform tread depth, within $\frac{1}{4}$ " variation, for each flight of stairs **[.452(e)(4)(xiv)]**.





Ramps and Walkways. Ramps and walkways 6' or more above lower levels must have guardrails that comply with 29CFR1926 Subpart M – Fall Protection [.451(e)(5)(i)]. No ramp or walkway shall incline more than 1:3 (1 vertical to 3 horizontal, or 20° above the horizontal) [.451(e)(5)(ii)]. 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" apart to provide footing [.451(e)(iii)].

Direct Access. Direct access to or from another surface is permitted only when the scaffold is not more than 14" horizontally and not more than 24" vertically from the other surface [.451(e)(8)] (pictured at right).



Erectors or Dismantlers. Employers are required to provide safe access for employees erecting or dismantling supported scaffolds where it is feasible, and where it does not create a greater hazard [.451(e)(9)(i)]. Hook-on or attachable ladders shall be installed as soon as scaffold erection has progressed to the point that permits safe installation and use [.451(e)(9)(ii)]. When erecting and dismantling tubular welded-frame scaffolds, end frames may be used as climbing devices for access, provided that [.451(e)(9)(iii)]:

- Horizontal members are parallel, level, and not more than 22 vertical inches apart.
- They are erected in a manner that creates a usable ladder and provides good hand hold and foot space.

Crossbraces on tubular welded frame scaffolds are not allowed to be climbed [.451(e)(9)(iv)].

Competent Persons. The competent person is responsible for determining the safety and feasibility of installing and using safe means of access based on site conditions and the type of scaffold involved [.451(e)(9)(i)].

Fall Protection

The number one scaffold hazard is worker falls. Fall protection consists of either personal fall-arrest systems or guardrail systems.

General. Each employee on a scaffold more than 10' above a lower level must be protected from falling to that lower level [.451(g)(1)]. Fall protection consists of either personal fall-arrest systems or guardrail systems meeting OSHA requirements



[.451(g)(1)]. Employee performing overhand bricklaying operations from a supported scaffold must be protected from falling from all sides and ends of the scaffold, except at the side next to the wall being laid **[.451(g)(1)(vi)]**.

Fall-arrest Systems. In addition to meeting the requirements of 1926.502(d), personal fall-arrest systems used on scaffolds are to be attached by lanyard to a vertical lifeline, horizontal lifeline, or scaffold structural member **[.451(g)(3)]**.



- When vertical lifelines are used, they must be fastened to a fixed safe point of anchorage, independent of the scaffold, and be protected from sharp edges and abrasion. In the photo to the left, that employee today would be wearing a full-body harness. Safe points of anchorage include structural members of buildings, but not standpipes, vents, electrical conduit, etc. which may give way under the force of a fall **[.451(g)(3)]**.
- It is dangerous and therefore impermissible for two or more vertical lifelines to be attached to each other or to the same point of anchorage **[.451(g)(3)(iv)]**.
- When horizontal lifelines are used, they are to be secured to two or more structural members of the scaffold **[.451(g)(3)(ii)]**.

Guardrail Systems. Guardrail systems must be installed along all open sides and ends of platforms and they must be in place before the scaffold is released for use by employees other than erection/dismantling crews **[.451(g)(4)(i)]**. Walkways located within a scaffold must have guardrail systems installed within 9¹/₂" of and along at least one side of the walkway **[.451(g)(1)(v)]**. Each toprail or equivalent member of a guardrail system must be able to withstand a force of at least 200 pounds applied in any downward or horizontal direction at any point along its top edge **[.451(g)(4)(vii)]**. The scaffold in the picture to the right doesn't have a guardrail system and the scaffold is not tied off to the building (and no fall protection).



- The top edge height of toprails on supported scaffolds must be between 36" and 45". See



next paragraph [.451(g)(4)(ii)].

- When conditions warrant, the height of the top edge may exceed the 45" height, provided the guardrail system meets all other criteria. (Note: the minimum top edge height on scaffolds manufactured or placed in service after 1/1/2000 is 38") [.451(g)(4)(ii)].

Midrails, screens, mesh, intermediate vertical members, solid panels, etc. must be able to withstand a force of at least 150 pounds applied in any downward or horizontal direction at any point along the midrail or other member [.451(g)(4)(ix)].

- When midrails are used, they must be installed at a height approximately midway between the top edge of the guardrail system and the platform surface [.451(g)(4)(iv)].
- When screens and mesh are used, they must extend from the top edge of the guardrail system to the scaffold platform and along the entire opening between the supports [.451(g)(4)(v)].
- When intermediate members (such as balusters or additional rails) are used, they must be no more that 19" apart [.451(g)(4)(vi)].

Guardrails must be surfaced to prevent punctures or lacerations to employees and to prevent snagging of clothing, which may cause employees to lose their balance [.451(g)(4)(xi)]. Ends of rails may not extend beyond their terminal posts unless they do not constitute a projection hazard to employees [.451(g)(4)(xii)]. In lieu of guardrails, crossbracing may serve as a toprail or midrail providing the crossing point is:



- Between 20 and 30" above the work platform for a midrail, (no midrail in picture to the left, and illegal to have mortarboard on cantilevered platform) or
- Between 38 and 48" above the work platform for a toprail [.451(g)(4)(xv)].



Erectors and Dismantlers. Employers are required to provide fall protection for employees erecting or dismantling supported scaffolds where it is feasible and where installing and using it does not create a greater hazard [.451(g)(2)].

Competent Person. The employer must designate a competent person, who would be responsible for determining the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds [.451(g)(2)].

Platform

Except when used only as a walkway, the platform is the work area of the scaffold; therefore, an inspection of a scaffold platform requires security checks of both the platform structure and how the platform is to be used by the workers – the scaffold users.

Planking. Each platform must be fully planked or decked between the front uprights and the guardrail supports – not like the picture on the right [.451(b)(1)]. Platforms used solely as walkways, or during erection or dismantling, require only the planking that the employer establishes is necessary to provide safe working conditions [.451(b)(1)(ii)]. No gaps greater than 1" are permitted between adjacent planks



or deck units, or between the platform and the uprights, unless the employer can demonstrate that a wide space is necessary. In such cases, the gap will be as small as possible and not exceed 9¹/₂" [.451(b)(1) and (ii)]. Wooden planking must be covered with opaque finishes, except that platform edges may be marked for identification. Platforms may be coated periodically with wood preservatives, fire retardants, and slip-resistant finishes provided they do not obscure the top or bottom wood surfaces [.451(b)(9)]. Scaffold platforms and walkways must be at least 18" wide unless they are used in area that the employer can demonstrate are so narrow that they must be wide as feasible, and all fall protection must be provided [.451(b)(2)(ii)]. Nothing that could cause a slip, trip, or fall (i.e. tools, scrap material, chemicals, snow, ice, etc.) is allowed to accumulate on the platform [.451(f)(8) and (f)(13)]. (*TIP:* for the same reason, cleats or other means of connecting planks should be on the underside.) When moving platforms to the next level, the existing platform must be left undisturbed until the new end frames have been set in place and braced [.452(c)(1)].

Lumber Grading. Scaffold-grade lumber is meant to withstand forces not



imposed on ordinary, construction-grade wood (which is only $\frac{2}{3}$ the capacity of scaffold grade). Using construction-grade lumber on a scaffold platform not only violates OSHA standards, but it is also an unsafe practice and an invitation to a deadly accident.

The quality of scaffold-grade lumber is measured by:

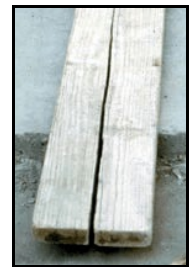
- the number of rings per inch (6 [six] or more);
- the slope of the grain (1" to the side for every 16" along the length of the board for Douglas Fir, $\frac{1}{14}$ for Southern Pine); and
- the number of defects, such as knots and notches.

Solid sawn wood used for scaffold planks should follow the grading rules of a recognized lumber grading association or an independent lumber inspection agency and be identified by that agency or association's grade stamp. Such organizations and their grading rules must be certified by the Board of Review of the American Lumber Standard Committee, per the U.S. Department of Commerce.



OSHA does not inspect lumber; therefore, any scaffold planking stamped "OSHA Approved" is, at best, misleading and should not be assumed to meet the standard on the basis of that stamp alone. An inspection agency can claim that its product meets OSHA requirements; however, because a scaffold plank may still be in service long after the grade stamp has faded, workers should pay attention to the quality and condition of the planking, whether it bears a stamp or not.

Wood Condition. As wood ages and reacts with usage, it will begin to show checks, splits, and notches. These will vary in degree depending on the loads a plank has carried, the weather it has been exposed to, how long it has been in use, etc. Planks with **splits** (cracks that go clear through the wood) more than a few inches in length should not remain in service, as they may no longer maintain the necessary load-bearing capacity. Planks with **checks** (cracks that are on the surface only and do not go through the wood) should be watched, as the checks may develop into splits over time. **Notches** (small checks on the ends of a plank) should also be watched over time as they can lengthen and deepen until they become splits. Scaffold planks that have **accumulated layers** of





paint, plaster, etc. are not permitted to remain in service [.451(b)(9)] because it is impossible to determine their condition. Dangerous splits may be hidden underneath these coatings. If a scaffold plank has been used as a mudsill, it should not be returned to service on a platform. Moisture from standing water, as well as point-loading from the scaffold legs, may have weakened it, making it unable to bear the weight that will be placed on it.

Allowable Spans. The span of a scaffold plank is the distance it runs between supports. The longer the span, the more deflection (bend) it will have, and therefore, the less its load-bearing capacity will be. For 2x10 (nominal) or 2x9 (rough) solid sawn wood planks, allowable spans for a given load are shown below:

Maximum Intended Load	Maximum Permissible Span Using Full thickness Lumber	Maximum Permissible Span Using Nominal thickness Lumber
25 lbs. per square foot	10 feet	8 feet
50 lbs. per square foot	8 feet	6 feet
75 lbs. per square foot	6 feet	--

Because nominal thickness lumber is not cut to its exact dimensions, nominal 2x10 is really more like 1½ x 9¼. As a result, it does not have the same load-bearing capacity of full thickness lumber.

For fabricated plants and platforms, maximum spans are to be recommended by the manufacturer based on the following table:

Rated Load Capacity	Intended Load
Light-duty	25 lbs/square foot applied uniformly over the entire span area
Medium-duty	50 lbs/square foot applied uniformly over the entire span area
Heavy-duty	75 lbs/square foot applied uniformly over the entire span area
One-person	250 lbs/ft ² placed at the center of the span (total 250 lbs.)

Continued ➤



Rated Load Capacity	Intended Load
Two-person	250 lbs. placed 18" to the left and right of the center of the span (total 500 lbs.)
Three-person	250 lbs. placed at the center of the span and 250 lbs placed 18" to the left and right of the center of the span (total 750 lbs.)

Allowable Deflection. To assure that scaffold planking remains within its safe load-bearing capacity, it may not be allowed to deflect more than $\frac{1}{60}^{\text{th}}$ of its span between supports [.451(f)(16)].

Span of Plank Between Supports	Calculation	Maximum Permissible Deflection
10 feet	120"/60"	2"
7 feet	84"/60"	1 $\frac{3}{8}$ "
5 feet	60"/60"	1"

Workers should be aware of deflection because it can indicate when a platform is overloaded, and a competent person should not allow employees to occupy a platform that exceeds the $\frac{1}{60}^{\text{th}}$ ratio.

Working Distance. For most activities, there must be no more than a 14" gap between the scaffold platform and the structure being worked on. On lathing and plastering, a gap of 18" is permitted [.451(b)(3) and (b)(3)(ii)].

Overlap. To prevent slippage, platforms must be cleated or otherwise restrained at each end or overlap centerline support at least 6" [.451(b)(4)]. The photo to the right is an example of a scaffold that is not fully planked. Also planks are not cleated or otherwise secured against displacement. There is also more than a 14" gap between the building and the scaffold platform, no guardrails, and no toeboards.





Unless it is designed and installed to support employees and materials without slipping, or had guardrails that block employee access, each end of a platform may not extend over its support more than 12", for platforms 10' or shorter in length, or more than 18", for platforms more than 10' long **[.451(b)(5)]**.

On scaffolds where platforms are overlapped to create along platform, the overlap may only occur over supports and may not be less than 12", unless the platforms are restrained (i.e. nailed together) to prevent movement **[.451(b)(7)]**.

On scaffolds where platforms are abutted to create a long platform, each abutted end must rest on a separate support surface **[.451(b)(6)]**. (This does not preclude the use of shared support members such as "T" sections, hook-on platforms that rest on common supports, etc.)

When platforms must overlap because a scaffold changes direction, such as turning a corner, platforms that rest on a bearer at an angle other than a right angle shall be laid first and platforms that rest at right angles over the same bearer shall be laid second, on top of the first platform **[.451(b)(8)]**.

Brackets. When brackets are used to support cantilevered platforms, they must:

- Be seated with side-brackets parallel to the frames, and end-brackets at 90° to the frames **[.451(c)(5)(i)]**.
- 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 other loads **[.451(c)(5)(iii)]**.

Capacity. Scaffold platforms must be able to support their own weight plus four times the maximum intended load **[.451(a)(1)]**. Do not load the scaffold or any component parts beyond their maximum capacity (their own weight and 4:1 the maximum intended load). A scaffold can be overloaded by:

- Too many people being on the platform;
- Too much material being stored on the platform; and
- Point loading, or concentrating too much of the load in one area **[.451(f)(1)]**.





Falling Object Protection. There are 2 (two) kinds of falling object hazards associated with scaffolds. One concerns the employees on the scaffold itself, while the other concerns employees who may work in or enter the area below the scaffold.

Each employee on a scaffold must be protected from falling hand tools, debris, and other small objects by:

- Hard hats;
- Toeboards, screens, or guardrail systems;
- Debris nets or canopy structures that contain or deflect falling objects; and
- Placement of potential falling objects away from the edge of the surface from which they may fall when the falling objects are too large, heavy, or massive to be contained or deflected by any of the above-listed measures **[.451(h)(1)]**.

Where there is a danger of tools, materials, or equipment falling from a scaffold to employees below, they must be protected by:

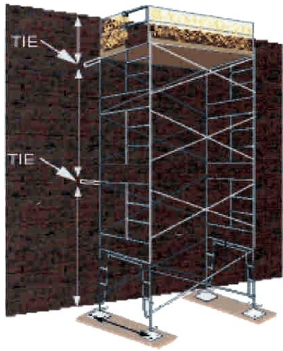
- The area below the scaffold being barricaded so employees are not permitted to enter; or
- Toeboards being installed along the edge of platforms more than 10' above lower levels.
- Where tools, materials, or equipment are piled to a height higher than the top edge of the toeboard, they should be prevented from falling by paneling or screening extending from the toeboard to the top of the guardrail; or
- A guardrail system shall be installed with openings small enough to contain the objects; or
- A canopy structure, debris net, or catch platform strong enough to withstand the impact of the potential falling objects shall be erected over the employees **[.451(h)(2)]**.

When toeboards are used for falling object protection, they must be:

- Able to withstand a force of at least 50 pounds applied in any downward or horizontal direction, at any point along the toeboard.



- At least $3\frac{1}{2}$ " high from the top edge to the level of the walking/working surface.
- Securely fastened in place at the outermost edge of the platform, and not have more than $\frac{1}{4}$ " clearance above the walking/working surface.
- Solid, or with openings not over 1" [.451(h)(4)]. (See Appendix A of Subpart L for non-mandatory toeboard guidelines.)



Keeping Upright.

Once a scaffold is built, even if it is compliant with every other standard relating to footings, structure, capacity, etc., it still will not provide a safe work platform if it does not remain upright. As a general rule, a scaffold becomes inherently unstable once its height is 4 (four) times its minimum base dimension, even if it is plumb and square. Extreme weather or damage to structural components can also affect a scaffold's stability.

Guys, Ties, and Braces. When a supported scaffold reaches a height that is more than 4 (four) times its minimum base dimension (4:1), it must be restrained by guys, ties, and braces to prevent it from tipping [.451(c)(1)].

- Guys, ties, and braces must be installed at locations where horizontal scaffold components support both inner and outer legs [.451(c)(1)(i)].
- Guys, ties, and braces must be installed according to the scaffold manufacturer's recommendations or at the closest horizontal member to the 4:1 height ratio and be repeated every 20 vertical feet for narrow scaffolds (3' or less in width), and every 26 vertical feet for scaffolds greater than 3' in width [.451(c)(1)(ii)].
- Ties, guys, braces, or outriggers shall be used to prevent tipping of supported scaffolds bearing eccentric loads, such as cantilevered work platforms [.451(c)(1)(iii)].



Inspection. Scaffolds and scaffold components must be inspected before each shift by a competent person for visible defects and after each occurrence that



could affect a scaffold's integrity (such as being hit by a crane) **[.451(f)(3)]**. Any part of a scaffold that has been damaged or weakened so that it no longer meets OSHA strength requirements must either be repaired, replaced, braced, or removed from service **[.451(f)(4)]**.

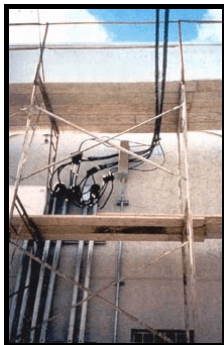
Moving Scaffolds. Scaffolds may not be moved horizontally while employees are on them unless they have been designed for that purpose by a registered professional engineer, or in the case of mobile scaffolds, where the provisions of 1926.452(w) are followed **[.451(f)(5)]**.

Weather. Employees are not permitted to work on or from a scaffold during storms or high wind unless a competent person has determined that it is safe and that those employees are protected by personal fall-arrest systems or wind screens (when windscreens are used, the scaffold must be secured against the anticipated wind forces) **[.451(f)(12)]**.

Electrical Hazards

Because they may be built in proximity to overhead power lines, and because they are often made of metal, scaffolds can put workers at risk of electrocution. This risk can be removed through proper clearance and maintenance.

Overhead Power Lines. Scaffolds must not be close enough to overhead power lines that they, or any conductive materials (e.g. building materials, paint roller extensions, scaffold components) may be handled on them, come closer than 10' to the power line. The exception is that insulated power lines of less than 300 volts have a safe distance of only 3'. (*TIP:* Because it may be difficult to determine if a power line is insulated, or what its exact voltage is, the 10' rule should always be applied.)



Scaffolds may be closer to overhead power lines than specified above if such proximity is necessary for the type of work being done and if the power company or electrical system operator has been notified and has either

- De-energized the lines;
- Relocated the lines; or
- Installed protective coverings to prevent accidental contact with the lines **[.451(f)(6)]**.



Portable Electric Tools. Because metal frame scaffolds are conductive, power tools, cords, etc. that suffer insulation failure can electrify the entire scaffold. This poses a risk of electrocution not just to the worker holding the tool, but to everyone who contact the scaffold. Therefore, all portable electric equipment must be protected by GFCIs (ground-fault circuit interrupters) or an AEGCP (assured equipment grounding conductor program) in accordance with 1926.404(b)(1)(i).

TIP: Often, a worker who is shocked survives the current, only to lose balance and be killed in a fall. This is one more reason for always using fall protection.

MOBILE SCAFFOLD

Mobile scaffolds are a type of supported scaffold set on wheels or casters. They are designed to be easily moved and are commonly used for things like painting and plastering, where workers must frequently change position. The following requirements apply to this scaffold type only.

General Requirements. Mobile scaffolds must be plumb, level, and squared [1926.452(w)(1)] – hereafter referred to as “.452”. To prevent collapse of the scaffold and to secure vertical members together laterally and to automatically square and align vertical members, scaffolds must be braced by:

- Cross braces;
- Horizontal braces;
- Diagonal braces; or
- A combination of braces [.452(w)(1)].



All brace connections must be secured [.452(w)(1)].

To prevent movement of the scaffold while it is being used in a stationary position, scaffold casters and wheels must be locked with positive wheel locks, and/or wheel and swivel locks, or equivalent means [.452(w)(2)]. Caster stems and wheel stems in scaffold legs or adjustment screws must be pinned or otherwise secured [.452(w)(9)].

Platforms must not be extended beyond the base supports of the scaffold, unless stability is ensured by outrigger frames, or equivalent devices [.452(w)(7)] leveling of the scaffold, where necessary, must be achieved by the use of screw jacks or equivalent means [.452(w)(8)].



Scaffolds constructed of tube and coupler components must also comply with the requirements of paragraph (b) of this section [.452(w)(1)(i)]. Scaffolds constructed of fabricated frame components must also comply with the requirements of paragraph (c) of this section.

Moving. Scaffolds shall be stabilized to prevent tipping during movement [.452(w)(5)]. Manual force used to move the scaffold must be applied as close to the base as practicable, but not more than 5' above the supporting surface [.452(w)(4)]. Power systems used to propel mobile scaffolds must be designed for that purpose. Forklifts, trucks, motor vehicles, or add-on motors must not be used to propel scaffolds unless the scaffold is designed for them [.452(w)(6)]. Employees are not allowed to ride on scaffolds unless the following conditions exist [.452(w)(6)]:

- The surface on which the scaffold being moved is:
 - Within 3° of level, and
 - Free of pits, holes, and obstructions [.452(w)(6)(i)];
- The height to base width ratio of the scaffold during movement is 2:1 or less, unless the scaffold is designed and constructed to meet or exceed nationally recognized stability test requirements (such as ANSI/ASME A92.5 and 92.6) [.452(w)(6)(ii)];
- Outrigger frames, when used, are installed on both sides of scaffolds [.452(w)(6)(ii)];
- When power systems are used, the propelling force is:
 - Applied directly to the wheels, and
 - Does not produce a speed in excess of 1' /second [.452(w)(6)(iv)].

Before a scaffold is moved, each employee on the scaffold must be made aware of the move [.424(w)(10)].

Non-mandatory Guidelines. Stability tests as described in ANSI A92, as appropriate for the type of scaffold, can be used to establish stability in compliance with paragraph (w)(6) of this section [.452(w)(10)].

PUMP JACK

Pump jacks are a uniquely designed scaffold consisting of a platform supported by moveable brackets on a vertical pole. The brackets are designed to be raised and lowered in a manner similar to an automobile jack. Pump jacks are appealing for certain applications because they are easily adjusted to variable heights and are



relatively inexpensive. The following requirements apply to this scaffold type only.

General Requirements. Pump jack brackets, braces, and accessories must be fabricated from metal plates and angles [.452(j)(1)]. Each pump jack bracket must have two positive gripping mechanisms to prevent any failure of slippage [.453(j)(1)]. When guardrails are used for fall protection, a workbench may be used as the toprail only if it meets all requirements of paragraphs

.451(g)(4)(ii),(vii),(viii), and (xiii) [.452(j)(3)]. Work benches must not be used as scaffold platforms [.452(j)(4)]. Poles must be secured by rigid triangular bracing, or equivalent, at the bottom, top, and other points are necessary [.452(j)(2)].

When bracing already installed has to be removed so the pump jack can pass, an additional brace must be installed approximately 4' above the original brace before it is removed. The additional brace must be left in place until the pump jack has been moved and the original brace reinstalled [.452(j)(2)].

When poles are made of wood, the pole lumber must be:

- Straight-grained;
- Free of shakes; and
- Free of large loose or dead knots and other defects that might impair strength [.452(j)(6)].

When wood poles of two continuous lengths are joined together, the seam must be parallel to the bracket. To develop full strength when 2x4s are spliced to make a pole, mending plates must be installed at all splices [.452(j)(7)].

Non-mandatory Guidelines. Wood poles may not exceed 30' in height [Subpart L Appendix A(j)]. When 2x4s are spliced together to make a 4x4" wood pole, they must be spliced with 10 penny common nails no more than 12" center to center and staggered uniformly from the opposite outside edges.

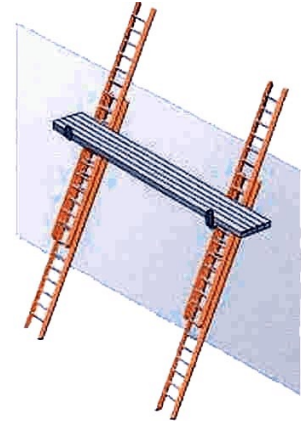
Maximum intended load for pump jack scaffolds is 500 pounds, applied at the center of the platform span [Subpart L Appendix A(j)]. No more than two employees may be on a pump jack scaffold between any two supports at one time. [Subpart L Appendix A(2)(j)].



LADDER JACK

A ladder jack scaffold is a simple device consisting of a platform resting on brackets attached to a ladder. Ladder jacks are primarily used in light applications because of their portability and low cost. The following requirements apply to this scaffold type only.

Support. All ladders used to support ladder jack scaffolds must comply with 1926 Subpart X – Stairways and Ladders [452(k)(2)]. (Exception: Job-made ladders must not be used to support ladder jack scaffolds.) Ladder jack scaffolds must be designed and constructed to bear on:



- The side rails and ladder rungs; or
- The ladder rungs alone.
 - If ladder jacks bear on the ladder rungs alone, the bearing area must include a length of at least 10" on each rung [452(k)(3)].

Ladders used to support ladder jack scaffolds must be:

- Placed to prevent slipping;
- Fastened to prevent slipping; or
- Equipped with devices to prevent slipping [452(k)(4)].

Platforms. Platforms should not be placed higher than 20' from the supported base [452(k)(1)]. Scaffold platforms must not be bridged together [452(k)(5)].

Non-mandatory Guidelines. Ladder jack scaffolds have a maximum intended load of 25 pounds per square foot. Not more than 2 (two) employees may occupy any platform at one time. The maximum span between supports is 8' [1926 Subpart L Appendix A(2)(k)].

TUBE AND COUPLER

Tube and coupler scaffolds are so-named because they are built from tubing connected by coupling devices. Due to their strength, they are frequently used where heavy loads need to be carried, or where multiple platforms must reach

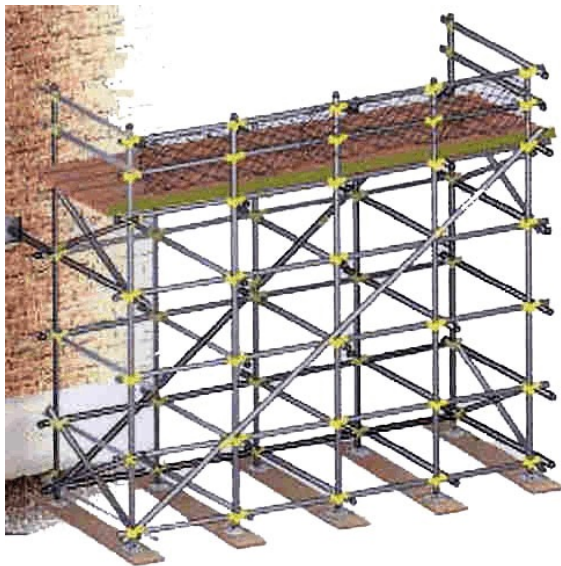


several stories (bucks) high. Their versatility, which enables them to be assembled in multiple directions in a variety of settings, also makes them hard to build correctly. The following requirements apply to this scaffold type only.

General Requirements. When platforms are being moved to the next level, the existing platform must be left undisturbed until the new bearers have been:

- Set in place; and
- Braced before receiving the new platform [(.452(b)(1)].

Couplers must be made of a structural metal, such as:



- Drop-forged steel;
- Malleable iron; or
- Structural-grade aluminum [452(b)(9)].

The use of couplers made from gray cast iron is prohibited [452(b)(9)].

Tube and coupler scaffolds over 125' in height must be designed by a registered engineer and constructed and loaded in accordance with that design [452(b)(10)]. See Appendix A for non-mandatory examples of design and loading criteria.

Bracing. Transverse bracing forming an “X” across the width of the scaffold must be installed at the scaffold ends, and at least at every third set of posts horizontally (measured from only one end) and every fourth runner vertically [452(b)(2)]. Bracing must extend upward diagonally to opposite sides of the scaffold, such as from the inner posts or runners to the next outer posts or runners, or vice versa [452(b)(2)].

Building ties must be installed at the bearer levels between the transverse bracing and meet the requirements of 1926.451(c)(1) [452(b)(2)].

On straight run scaffolds, longitudinal bracing across the inner and outer rows of posts must be installed diagonally in both directions and extend upward from the base of the end posts to the top of the scaffold at approximately 45° angle [452(b)(3)]. On scaffolds whose length is greater than their height, longitudinal bracing must be repeated beginning at least at every fifth post [452(b)(3)]. On



scaffolds whose length is less than their height, longitudinal bracing must 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 [.452(b)(3)].

Bracing must be installed as close as possible to the intersection of the barer and post or runner and post [.452(b)(3)]. Where the conditions do not permit the attachment of bracing to posts, bracing must be attached to the runners as close to the post as possible [.452(b)(4)].

Bearers. When bearers are coupled to posts, the inboard coupler must bear directly on the runner coupler and be as close to the posts as possible [.452((b)(5)]. Bearers must extend beyond the posts and runners and provide full contact with the coupler [.452(b)(6)]. The bottom bearers must be located as close to the base as possible [.452(b)(8)].

Non-mandatory Guidelines.

Minimum Size of Members [1926 Subpart L Appendix A(2)(b)]			
	Light Duty	Medium duty	Heavy Duty
Maximum Intended Load	25 lbs/ft ²	50 lbs/ft ²	75 lbs/ft ²
Posts, runners, and braces - NOTE: longitudinal diagonal bracing must be installed at an angle of 45° (± 5°).	Nominal 2" (1.9") OD steel tube or pipe	Nominal 2" (1.9") OD steel tube or pipe	Nominal 2" (1.9") OD steel tube or pipe
Bearers NOTE: Bearers must be installed in the direction of the shorter dimension.	Nominal 2" (1.9") OD steel tube or pipe and a maximum post spacing of 4' x 10'	Nominal 2" (1.9") OD steel tube or pipe and a maximum post spacing of 4' x 7' or Nominal 2/5" (2.375") OD steel tube or pipe and maximum post spacing of 6' x 6"	Nominal 2" (1.9") OD steel tube or pipe and a maximum post spacing of 6' x 6'
Max. runner spacing vertical	6' 6"	6' 6"	6' 6"



Maximum Number of Planked Levels (1926 Subpart L Appendix A (2)(b))				
Maximum Number of Additional Planked Levels				
	Light Duty	Medium Duty	Heavy Duty	
Number of Working Levels				Maximum Height of Scaffold
1	16	11	9	125'
2	11	1	0	125'
3	6	0	0	125'
4	1	0	0	125'

POLE OR WOOD POLE

Pole scaffolds are a typical type of supported scaffold in which every structural component, from uprights to braces to platforms, is made of wood. OSHA has standards for two kinds: single-pole, which are supported on their interior side by a structure or wall, and double-pole, which are supported by double uprights independent of any structure. Because they have to be built from scratch and cannot easily be reused, pole scaffolds are considered old-fashioned and are rarely used. The following requirements apply to this scaffold type only.

General Guidelines. When platforms are moved to the next level, the existing platform must be left undisturbed until the new bearers have been set in place and braced [.452(a)(1)]. Where wooden poles are spliced, the following regulations apply:

- The ends must be squared;
- The upper section must rest squarely on the lower section;





- Wood splice plates or scab plates must be provided on at least two adjacent sides, and must:
 - Extend at least 2' on either side of the splice;
 - Overlap the abutted ends equally; and
 - Have at least the same cross-sectional areas as the pole; and
- Splice plates made of materials other than wood may be used, as long as they are of equivalent strength [.452(a)(9)].

Pole scaffolds over 60' in height must be designed by a registered professional engineer and be constructed and loaded in accordance with that design [.452(q)(10)]. (Note: Non-mandatory Appendix A to this subpart contains examples of criteria that will enable an employer to comply with design and loading requirements for pole scaffolds under 60' in height.)

Braces, Bearers, and Runners. Crossbracing must be installed between the inner and outer sets of poles on double pole scaffolds [.452(a)(2)]. Diagonal bracing must be installed in both directions across the entire outside face of double- and single-pole scaffolds [.452(a)(4)] and the entire inside face of double-pole scaffolds used to support loads of 50 lbs. or more per square foot [.4542(a)(3)].

Runners and bearers must be installed on edge [.452(a)(5)]. Bearers must extend a minimum of 3" over the outside edge of runners [.452(a)(6)]. Runners must extend over two poles, minimum, and be supported by bearing blocks securely attached to the poles [.452(a)(7)]. Braces, bearers, and runners must not be spliced between poles [.452(a)(8)].

Non-mandatory Guidelines. 1926 Subpart L Appendix A(2)(a) contains tables poles, runners, bearers, planking, bracing, and tie-ins for single- and double-pole (independent) wood pole scaffolds.

SPECIALTY AND OTHER SCAFFOLDS

Many scaffold types regulated by OSHA standards are rarely used and designed for a very narrow and specific range of applications. The following requirements apply to these scaffold types only.

PLASTERERS', DECORATORS', AND LARGE-AREA SCAFFOLDS



General Requirements. Scaffolds shall be constructed in



accordance with the following paragraphs of this section, as appropriate: pole scaffolds; tube and coupler scaffolds; and fabricated frame scaffolds [.452(d)].

Non-mandatory Guidelines. The guidelines for pole scaffolds, Appendix A(2)(a), or tube and coupler scaffolds, Appendix A(2)(b), may be applied [1926 Subpart L Appendix A(2)(d)].

BRICKLAYERS' SQUARE SCAFFOLDS



General Requirements. Scaffolds of wood must be reinforced with gussets on both sides of each corner [.452(e)(1)]. Diagonal braces must:

- Be installed on all sides of each square [.452(e)(2)];
- Be installed between squares on the rear and front sides of the scaffold; and
- Extend from the bottom of each square to the top of the next square [.453(e)(3)].

The scaffolds must be constructed and arranged so that one square rests directly above the other and they are not to exceed 3 (three) tiers in height [.452(e)(4)]. The upper tiers must stand on a continuous row of planks laid across the next lower tier and be nailed down or otherwise secured to prevent displacement [.452(e)(4)].

Non-mandatory Guidelines.

Maximum Intended Load	50 lbs/ft ² *
Maximum Width	5'
Maximum Height	5'
Gussets/Braces	1 x 6"
Legs	1 x 6"
Bearers (horizontal members)	1 x 6"
*The squares shall be set not more than 8' apart for light duty scaffolds and not more than 5' apart for medium duty scaffolds [Appendix A(2)(e)].	



HORSE SCAFFOLDS



General Requirements. Scaffolds must not be more than 10' or two tiers in height, whichever is less [.452(f)(1)]. When horses are arranged in tiers, each horse must be placed directly over the horse in the tier below [.452(f)(2)], the legs of each horse must be nailed down or otherwise secured to prevent displacement [.452(f)(3)], and each tier must be crossbraced [.452(f)(4)].

Non-mandatory Guidelines.

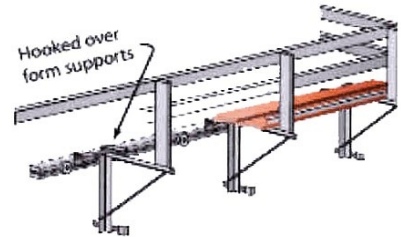
Maximum Intended Load (light duty)	25 lbs/ft ² *
Maximum Intended Load (medium duty)	50 lbs/ft ² *
Bearers (light duty)	2 x 4"
Bearers (medium duty)	3 x 4"
Legs	2 x 4"
Longitudinal Bracing between Legs	1 x 6"
Gusset Braces at Top of Legs	1 x 8"
Half Diagonal Braces	2 x 4"
*Horses shall be spaced not more than 8' apart for light-duty loads and not more than 5' apart for medium-duty loads [1926 Subpart L Appendix A(2)(f)].	

FORM SCAFFOLDS AND CARPENTERS' BRACKET SCAFFOLDS

General Requirements. Each bracket, except those for wooden bracket-form scaffolds, must be attached to the supporting framework or structure by one or more of the following:



- Nails;
- A metal stud attachment device;
- Welding;
- Hooking over a secured structural supporting member, with the form wales either:
 - Bolted to the form; or
 - Secured by snap ties or tie bolts extending through the form; and
 - Securely anchored; or
- (for carpenters' bracket scaffolds only) by a bolt extending through to the opposite side of the structure's wall **[.452(g)(1)]**.
- Wooden bracket-form scaffolds must be an integral part of the form panel **[.452(g)(2)]**.
- Folding-type metal brackets, when extended for use, must be either:
 - Bolted; or
 - Secured with a locking-type pin **[.452(g)(3)]**.



Non-mandatory Guidelines. Brackets are triangular shaped frames made of either wood with a cross-section not less than 2x3" or structural angle iron measuring 1¹/₄" x 1¹/₄" x 1¹/₈" **[1926 Subpart L Appendix A(2)(g)(1)]**. Bolts used to attach brackets to structures must not be less than 5⁵/₈" in diameter **[1926 Subpart L Appendix A(2)(g)(2)]**. Maximum bracket spacing is 8' on centers **[1926 Subpart L Appendix A(2)(g)(3)]**. No more than 2(two) employees may occupy any given 8' of a bracket of form scaffold at any one time **[1926 Subpart L Appendix A(2)(g)(4)]**. Tools and materials may not exceed 75 pounds in addition to the employees **[1926 Subpart L Appendix A(2)(g)(4)]**.

Wooden Figure-four Scaffolds [1926 Subpart L Appendix A(2)(g)(5)]	
Maximum Intended Load	25 lbs./ft ²
Uprights	2 x 4" or 2 x 6"
Bearers (two)	1 x 6"
Braces	1 x 6" Continued ►



**Wooden Figure-four Scaffolds
[1926 Subpart L Appendix A(2)(g)(5)]**

Maximum Length of Bearers (unsupported)	3' 6"
Outrigger bearers shall consist of two pieces of 1 x 6" lumber nailed on opposite sides of the vertical support [1926 Subpart L Appendix A(2)(g)(5)(i)] .	
Bearers for wooden figure-four scaffolds must be braced and secured to prevent tipping or turning and not project more that 3' 6" from the outside of the form support. The knee or angle brace must intersect the bearer at least 3' from the form and be at approximately a 45°. The lower end of the knee or angle brace must be nailed to a vertical support [1926 Subpart L Appendix A(2)(g)(5)(ii)] .	

**Metal Bracket Scaffolds
[1926 Subpart L Appendix A(2)(g)(6)]**

Maximum Intended Load	25 lbs./ft ²
Uprights	2 x 4"
Bearers	As Designed
Braces	As Designed

**Wooden Bracket Scaffolds
[1926 Subpart L Appendix A(2)(g)(7)]**

Maximum Intended Load	25 lbs./ft ²
Uprights	2 x 4" or 2 x 6"
Bearers	2 x 6"
Maximum Scaffold Width	3' 6"
Braces	1 x 6"



ROOF BRACKET SCAFFOLDS

General Requirements. Scaffold brackets must be constructed to fit the pitch of the roof and provide a level of support for the platform **[.452(h)(1)]**. Brackets

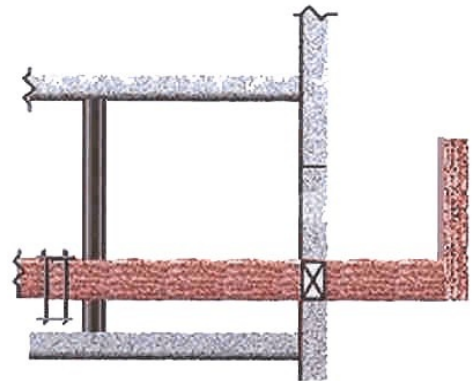


must be anchored in place by nails unless it is impractical to use nails **[.452(h)(2)]**. When nails are not used, brackets must be secured with first-grade manila rope of at least $\frac{3}{4}$ " diameter or equivalent **[.452(h)(2)]**.

OUTRIGGER SCAFFOLDS

General Requirements. Outrigger beams must be secured in place to prevent movement and securely braced at the fulcrum point to prevent tipping **[.452(i)(4)]**. The inboard end of outrigger beams must be not less than $1\frac{1}{2}$ times the length of the outboard end, measured from the fulcrum to the extreme anchorage point **[.452(i)(1)]**, and securely anchored by braced struts bearing against sills in contact with the overhead beams or ceiling by tension members secured to the floor joists underfoot, or both **[.452(i)(5)]**.

The fulcrum point of outrigger beams must rest on secure bearings at least 6" in each horizontal dimension **[.452(i)(3)]**. Outrigger beams fabricated in the shape of an I-beam or channel beam must be placed so that the web section is vertical **[.452(i)(2)]**. The entire supporting structure must be securely braced to prevent any horizontal movement **[.452(i)(6)]**. To prevent displacement, platform units must be nailed, bolted, or otherwise secured to outriggers **[.452(i)(7)]**.



Scaffolds and scaffold components must be designed by a registered professional engineer and constructed and loaded in accordance with that design **[.452(i)(8)]**.

WINDOW JACK SCAFFOLDS

General Requirements.

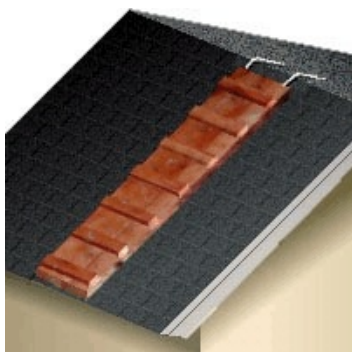
- Scaffolds must be securely attached to the window opening **[.452(l)(1)]**.



- Scaffolds must be used only for working at the window opening through which the jack is placed [.452(l)(2)].
- Window jacks must not be used to support planks or other elements of scaffolding placed between one window jack and another [.452(l)(3)].

Non-mandatory Guidelines. Not more than one employee at a time may occupy a window jack scaffold [1926 Subpart L Appendix A(2)(l)].

CRAWLING BOARDS (CHICKEN LADDERS)



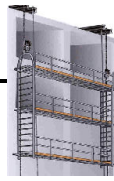
General Requirements. Crawling boards must extend from the roof peak to the eaves when used in roof construction, repair, or maintenance [.453(m)(1)]. The boards must be secured to the roof by ridge hooks or by means that provide equivalent strength and durability [.452(m)(2)].

Non-mandatory Guidelines. Crawling boards must not be less than 10" wide and 1" thick. Cleats on crawling boards must be equal in length to the width of the board, be spaced at equal intervals not to exceed 24", and have a minimum cross-sectional area of 1 x 1½" [1926 Subpart L Appendix A(2)(m)].

STEP, PLATFORM, AND TRESTLE LADDER SCAFFOLDS



General Requirements. Scaffold platforms must be placed no higher than the second-highest rung or step of the ladder supporting the platform [.452(n)(1)]. All ladders used in step, platform, and trestle ladder scaffolds must meet the requirements of 1926 Subpart X (Stairways and Ladders), except that job-made ladders are not permitted [.452(n)(2)], and be prevented from slipping by how they are placed, fastened, or equipped [.452(n)(3)]. Scaffolds must not be bridged to one another [452(n)(4)].



SCAFFOLD USER

SUSPENDED SCAFFOLDS

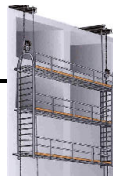
Suspended scaffolds are platforms suspended by ropes or other non-rigid means from an overhead structure. Because two-point scaffolds are the most common type of suspended scaffold, this section uses the two-point scaffold to describe requirements that apply to all suspended scaffolds. Requirements specific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

TWO-POINT(SWING STAGE) SCAFFOLD

Two-point adjustable suspension scaffolds, also known as swing-stage scaffolds, are perhaps the most common type of suspended scaffold. Hung by ropes or cables connected to stirrups at each end of the platform, they are typically used by window washers on skyscrapers, but play a prominent role in high-rise construction as well.



Sources: *A Guide to Scaffold Use in the Construction Industry*. U.S. Department of Labor. OSHA Publication 3150, revised. Small Business Safety Management Series. 173 pp. 2002. Downloaded as a PDF file 9/13/04 from <http://www.osha.gov/pls/publications/pubindex.list> and *Construction eTool*, “Scaffolding”, U.S. Department of Labor OSHA website. <http://www.OSHA.gov/SLTC/etools/scaffolding/supported/index.html>.



Anchorage

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



Tiebacks. Tiebacks must be secured to a structurally sound anchorage on the building or structure which may include structural members, but not vents, conduit, or standpipes and other piping systems [.451.(d)(3)(ix)]. They must be installed perpendicular to the face of the building or structure, or opposing angle tiebacks must be installed. Single tiebacks installed at an angle are prohibited [.451(d)(3)]. The tiebacks must be equivalent in strength to the suspension ropes and hoisting rope [.452(d)(3)(vii) and .452(d)(5)(iv)].



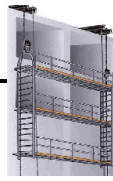
Counterweights. Suspended scaffold outrigger beams must be stabilized by counterweights or bolts or other direct connections to the floor or deck [.451(d)(3)]. Counterweights used to balance adjustable suspension scaffolds must be capable of resisting:

- At least 4 (four) times the tipping moment imposed by the scaffold when it is operating at the rate load of the hoist; or
- A minimum of 1½ times the tipping moment imposed by the scaffold when it is operating at the stall load of the hoist, whichever is greater [.451(a)(2)].

Only items specifically designed as counterweights may be used to counterweight scaffold systems. Therefore, masonry units, rolls of roofing felt, and other similar construction materials shall not be used as counterweight [.451(d)(3)(iii)]. Flowable materials such as sand, gravel, and similar materials that can be easily dislocated are also prohibited [.451(d)(3)(ii)].

Counterweights must be secured by mechanical means to the outrigger beams to prevent accidental displacement [.451(d)(3)(iv)] and they must not be removed from an outrigger beam until the scaffold is disassembled [.4451(d)(3)(v)]. However, it also is improper to make



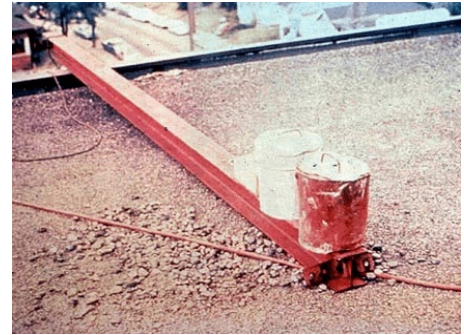


these same outrigger beam counterweights your anchorage for a personal fall-arrest system (PFAS) because the counterweights might accidentally become displaced if a bolted steel plate clamp becomes dislodged when pulled on by the PFAS rope – as in both the counterweight photos.



Direct Connections. Suspended scaffold outrigger beams must be stabilized by bolts or other connections to the floor or deck or by counterweights **[.451(d)(3)]**. In the photo below there aren't any bolts. There aren't any other connections. There aren't any allowable counterweights. And, there appears to be an electrical hazard. Direct connections to roofs and floors must also be capable of resisting:

- At least 4 (four) times the tipping moment imposed by the scaffold when it is operating at the rate load of the hoist; or
- A minimum of 1½ times the tipping moment imposed by the scaffold when it is operating at the stall load of the hoist, whichever is greater **[.451(a)(2)]**.



Support

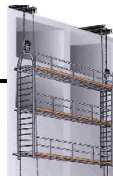
Adjustable suspension scaffolds are designed to be raised and lowered while occupied by workers and materials and must be capable of bearing their load whether stationary or in motion.

Capacity. Scaffolds and scaffold components must be capable of supporting, without failure, their own weight and at least 4 (four) times their maximum



intended load **[.451(a)]**. Each suspension rope, including connecting hardware, must be capable of supporting, without failure, at least 6 (six) times the maximum intended load applied to that rope while the scaffold is operating at the greater of either the rated load of the hoist or 2 (two) times the stall load of the hoist **[.451(a)(4)]**.

All suspension scaffold support devices, such as outrigger beams, cornice hooks, and parapet clamps must:



- Rest on surfaces capable of supporting at least 4 (four) times the load imposed on them by the scaffold operating at the greater of either:
 - the rated load of the hoist; or
 - 1¹/₂ times the stall capacity of the hoist



- **[.451(d)(1)].** How would you rate the parapet in the photo? Need a tieback? Bearing blocks?
- Be supported by bearing blocks **[.451(d)(5)(ii)].**
- Be secured against movement by tiebacks installed at right angles to the face of the building or structure or by opposing angle tiebacks installed and secured to a structurally sound point of anchorage (structurally sound points of anchorage include structural members, but not vents, electrical conduit, or standpipes, and any other piping systems) **[.451(d)(5)(ii)].** Would trust the hook support in the photo to the right – to hold?

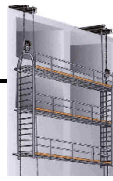


No more than 2 (two) employees should occupy suspension scaffolds designed for a working load of 500 pounds (non-mandatory) while no more than 3 (three) employees should occupy suspension scaffolds designed for a working load of 750 pounds (non-mandatory) **[1926 Subpart L Appendix(2)(p)(2)].**

Scaffolds shall be altered only under the supervision and direction of a competent person **[.451(f)(7)].**

Components. Scaffold components manufactured by different manufacturers must not be intermixed unless they fit together without being forced, and the scaffold's structural integrity is maintained. Scaffold components manufactured by different manufacturers are not allowed to be modified to make them fit together unless a competent person determines that the resulting scaffold is structurally sound **[.451(b)(10)].** Scaffold components made of dissimilar metals must not be used together unless a competent person has determined that galvanic action (rust) will not reduce the strength of any component below OSHA standards **[.451(b)(11)].** Scaffold support devices such as cornice hooks, roof hooks, roof irons, parapet clamps, or similar devices must be made of steel, wrought iron, or materials of equivalent strength **[.451(d)(5)(i)].**

Outrigger Beams. Outrigger beams must be made of structural metal or other



material of equivalent strength and they must be restrained to prevent movement [.451(d)(2)]. The inboard ends of outrigger beams must be stabilized by bolts or other direct connections to the floor or roof deck or by counterweights [.451(d)(3)]. Before the scaffold is used, direct connections of outrigger beams must be evaluated by a competent person to determine that the supporting surfaces are capable of bearing loads that will be imposed on them [.452(d)(3)(i)]. When outrigger beams are not stabilized by bolts or other direct connections to the floor or roof deck, they must instead be secured by tiebacks [.451(d)(3)(vi)].

Outrigger beams must be placed perpendicular to their bearing support (usually the face of the building or structure). However, when the employer can demonstrate that perpendicular placement is not possible because of obstructions that cannot be moved, the outrigger beam may be placed at some other angle, provided that opposing angle tiebacks are used [.451(d)(3)(viii)].

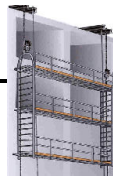
Outrigger beams shall be:

- Provided with stop bolts or shackles at both ends [.451(d)(4)(i)];
- Securely fastened together with the flanges turned out when channel iron beams are used instead of I-beams [.451(d)(4)(ii)];
- Installed with all bearing supports perpendicular to the beam center line [.451(d)(4)(iii)];
- Set and maintained with the web in a vertical position [.451(d)(4)(iv)];
and
- Attached to the scaffold ropes by a shackle or clevis placed directly over the stirrup [.451(d)(4)(v)].

Suspension Ropes. Suspension ropes supporting adjustable suspension scaffolds must have a diameter large enough to permit proper functioning of brake and hoist mechanisms [.4541(f)(10)]. The use of repaired wire rope as suspension rope is prohibited [.451(d)(7)]. Wire suspension ropes must not be joined together except with proper-sized thimbles and secured by eyesplicing or equivalent means [.451(d)(9)].



Ropes must be inspected for defects by a competent person prior to each workshift and after every occurrence which could affect a rope's integrity. (*TIP:* Analysis of Bureau of Labor Statistics data for suspended scaffold fatalities from 1992-99 found that over 20% of fall deaths were due to suspension ropes breaking. This study underlines the importance of inspecting ropes before every workshift.)



Ropes are to be replaced when any of the following conditions exist:

- Any physical damage which impairs the function and strength of the rope **[.452(d)(10)(i)]**;
- Kinks that might impair the tracking or wrapping of the rope around the drum or sheave of the hoist **[.451(d)(10)(ii)]**;
- Six randomly distributed wires are broken in one rope lay or three broken wires in one strand in one rope lay **[.451(d)(10)(iii)]**;
- Loss of more than one-third of the original diameter of the outside wires due to abrasion, corrosion, scrubbing, flattening, or peening **[.451(d)(10)(iv)]**.
- Heat damage caused by a torch or any damage caused by contact with electrical wires **[.451(d)(10)(v)]**; and
- Evidence that the secondary brake has been activated during an overspeed condition and has engaged the suspension rope **[.451(d)(10)(11)]**.



(10)(i): adhesive



(10)(ii): kinks



(10)(iii): broken wires

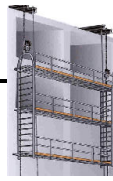
Swaged attachments or spliced eyes on wire suspension ropes may not be used unless they are made by the manufacturer or a qualified person **[.451(d)(11)]**.

When wire rope clips are used on suspension scaffolds:

- There must be a minimum of 3 (three) clips installed, with the clips a minimum of 6 (six) rope diameters apart **[.451(d)(12)(i)]**;
- Clips must be installed according to manufacturer's recommendations **[.451(d)(12)(ii)]**;
- Clips must be retightened to the manufacturer's after the initial loading **[.451(d)(12)(iii)]**;
- Clips are to be inspected and retightened to the manufacturer's recommendations at the start of each subsequent workshift **[.451(d)(12)(iv)]**;
- U-bolt clips may not be used at the point of suspension for any scaffold hoist **[.451(d)(12)(v)]**; and
- When U-bolt clips are used, the U-bolt must be placed over the dead end of the rope and the saddle must be placed over the live end of the rope

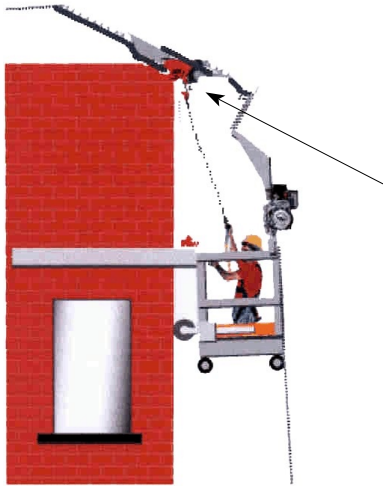


Violation of (12)(i)



[.451(d)(12)(vi)].

Suspension ropes are to 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 substances **[.451(f)(11)]**.



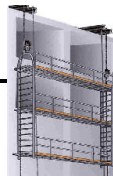
Hoists. The stall load of any scaffold hoist must not exceed 3 (three) times its rated load **[.451(a)(5)]**. (If a suspended scaffold becomes stuck while traveling, the hoist motor may strain and cause additional load on tiebacks, counterweights, or even the structure itself as depicted in the top right of the drawing to the left. Should these fail, the result may be a fatal fall.)

When winding drum hoists are used and the scaffold is extended to its lowest point of travel, there must be enough rope to still wrap 4 (four) times around the drum

[.451(d)(6)]. When other types of hoists are used, the suspension ropes must be long enough to allow the scaffold to travel to the level below without the rope end passing through the hoist, or else the rope end must be provided with means to prevent the end from passing through the hoist **[.451(d)(6)]**. Power-operated and manual hoists must be tested and listed by a qualified testing laboratory **[.451(d)(13)]**.

Gasoline-powered hoists may not be used on suspension scaffolds **[.451(d)(14)]**. Gears and brakes of power operated hoists used on suspension scaffolds must be enclosed. **[.451(d)(15)]**. In addition to the normal operating brake, both power-operated and manual hoists must have a braking device or locking pawl which engages automatically when the hoist experiences an instantaneous change in momentum or an accelerated overspeed episode **[.451(d)(16)]**. Manually operated hoists must require a positive crank force to descend **[.451(d)(17)]**.

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



Access

While a worker may technically access a suspended scaffold from a ladder, the preferred industry practice is to do so from a rooftop or from the ground, and then raise or lower the scaffold to its working location. Therefore, the ladder access is not discussed in this portion of the manual. To review ladder access requirements, refer to 1926.451(e) of Subpart L or the “Access” part of this manual’s “Supported Scaffolds” section.



General. Employees must be able to safely access any level of a scaffold that is 2' above or below an access point [.452(e)(1)].

Direct Access. Direct access to or from another surface is permitted only when the scaffold is not more than 14" horizontally and not more than 24" vertically from the other surface [.451(e)(8)]. For two-point adjustable suspension scaffolds, access to one platform from another may only take place when the platforms are the same height, are abutting, and have walk-through stirrups specifically designed for that purpose [.451(p)(6)].

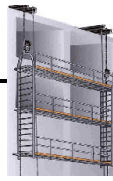
Fall Protection

The number one scaffold hazard is worker falls. Fall protection consists of either personal fall-arrest systems or guard rail systems which must be provided on any scaffold 10' or more above a lower level (two-point scaffolds require both PFAS and guardrail systems). This is especially critical with suspended scaffolds because they often are operated at extreme elevations.



General. Each employee on a scaffold more than 10' above a lower level must be protected from falling to that lower level [.452(g)(1)]. Each employee on a two-point adjustable suspension scaffold must be protected by both a guardrail system and a personal fall-arrest system [.451(g)(1)(ii)].

Fall-arrest Systems. In addition to meeting the requirements of 19226.502(d), personal fall-arrest systems used on scaffolds are to be attached by a lanyard to a vertical lifeline, horizontal lifeline, or scaffold structural member. **Note:** Vertical lifelines may not be used on two-point adjustable suspension scaffolds that have overhead components such as overhead protection or additional platform levels [.451(g)(3)].



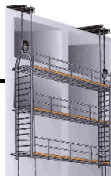
- When vertical lifelines are used, they must be fastened to a fixed safe point of anchorage, independent of the scaffold, and be protected from sharp edges and abrasion. Safe points of anchorage include structural members of buildings, but not standpipes, vents, electrical conduit, etc. which may give way under the force of a fall [.451(g)(3)]. Are the vertical lifelines in the photo at the right secured to a fixed point of anchorage independent of the scaffold?
- It is dangerous and therefore impermissible for two or more vertical lifelines to be attached to each other, or to the same point of anchorage [.451(g)(3)(iv)].
- When horizontal lifelines are used, they are to be secured to two or more structural members of the scaffold [.451(g)(3)(ii)].
- When lanyards are connected to horizontal lifelines or structural members, the scaffold must have additional independent support lines and automatic locking devices capable of stopping the fall of the scaffold in case one or both of the suspension ropes fail. These independent support lines must be equal in number and strength to the suspension ropes [.451(g)(3)(iii)].
- On suspended scaffolds with horizontal lifelines that may become vertical lifelines, the devices used to connect to the horizontal lifeline must be capable of locking in both directions [.502(d)(7)].



TIP: Almost all incidents that involve scaffold failure would not lead to fatality or serious injury if proper personal fall-arrest systems were in use. Hence, such incidents almost always involve two violations: one that causes the scaffold to fall, and the other when other workers fail to use (or their employers fail to provide) appropriate safety harnesses, lanyards, lifelines, etc.

Guardrail Systems. Guardrail systems must be installed along all open sides and ends of platforms, and must be in place before the scaffold is released for use by employees other than erection/dismantling crews [.451(g)(4)(i)]. Each toprail or equivalent member of a guardrail system must be able to withstand a force of at least 200 pounds applied in





any downward or horizontal direction, at any point along its top edge [.451(g)(4)(vii)]. The top edge height of top rails on supported scaffolds must be between 36" and 45". When conditions warrant, the height of the top edge may exceed the 45" height, provided the guardrail system meets all other criteria. (**Note:** the minimum top edge height on scaffolds manufactured or placed in service after 1/1/2000 is 38") [.451(g)(4)(ii)].

Midrails, screens, mesh, intermediate vertical members, solid panels, etc. must be able to withstand a force of at least 150 pounds applied in any downward or horizontal direction, at any point along the midrail or other member [.451(g)(4)(ix)].

- When midrails are used, they must be installed at a height approximately midway between the top edge of the guardrail system and the platform surface [.451(g)(4)(iv)].
- When screens and mesh are used, they must extend from the top edge of the guardrail system to the scaffold platform, and along the entire opening between the supports [.451(g)(4)(v)].
- When intermediate members (such as balusters or additional rails) are used, they must be no more than 19" apart [.451(g)(4)(vi)].

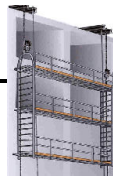
Guardrails must be surfaced to prevent punctures or lacerations to employees and to prevent snagging of clothing which may cause employees to lose their balance [.451(g)(4)(xi)]. Ends of rails may not extend beyond their terminal posts unless they do not constitute a projection hazard to employees [.451(g)(4)(xii)]. In lieu of guardrails, crossbracing may serve as a top rail or midrail, providing the crossing point is between 20 and 30" above the work platform for a midrail, or between 38 and 48" above the work platform for a top rail [.451(g)(4)(xv)]. For other scaffolding guardrail requirements, see .451(g)(4).

Erectors and Dismantlers. The fall protection requirements for employees installing suspension scaffold systems on floors, roofs, and other elevated surfaces are described in 1926 Subpart M.

Competent Person. The employer must designate a competent person who would be responsible for determining the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds [.451(g)(2)].

Platform

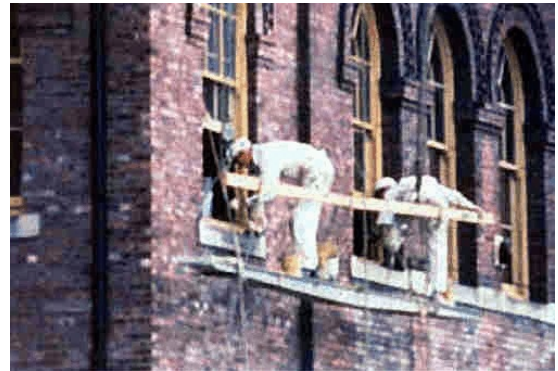
Because the platform is the work area of a suspended scaffold, an inspection



requires safety checks of both the platform structure and how the platform is used by the workers.

Decking. Platforms on two-point adjustable suspension scaffolds (swing stages) must be no more than 36" wide unless a qualified person has designed them to prevent unstable conditions **[.452(p)(1)]**. The platform must be securely fastened to hangers (stirrups) by U-bolts or by other means that make it capable of supporting its own weight and at least 4 (four) times its maximum intended load **[.452(p)(2)]**.

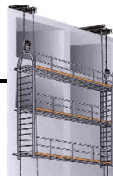
Platforms are to be either ladder-type, plank-type, beam-type, or light metal-type **[.452(p)(4)]**. For more on plank-type platforms, see the "Platform" part of this manual's "Supported Scaffolds" section. All platforms 40' or less in length, and light metal-type platforms with a rated capacity of 750 pounds or less, must be tested and listed by a nationally recognized testing laboratory **[.452(p)(4)]**. Scaffold platforms and walkways must be at least 18" wide, unless they are used in areas that the employer can demonstrate are so narrow that they must be less than 18" wide. In such cases, the platforms must be as wide as feasible, and fall protection must be provided **[.451(b)(2)(ii)]**. Nothing that could cause a slip, trip or fall (i.e. tools, scrap material, chemicals, snow, ice, etc.) is allowed to accumulate on the platform **[.451(f)(8)]**.



Devices whose sole function is to provide emergency escape and rescue may not be used as working platforms. This does not preclude the use of systems designed to function as both suspension scaffolds and emergency systems **[.451(d)(18)]**. Makeshift devices, such as boxes and barrels, may not be used on top of scaffold platforms to increase the height of the working level **[.451(f)(14)]**.

Ladders may not be used on scaffolds to increase the height of the working level, except on large-area scaffolds where employees have met the following criteria **[.451(f)(15)]**:

- When the ladder is placed against a structure which is not part of the scaffold, the scaffold must be secured against the sideways thrust exerted



by the ladder **[.451(f)(15)(i)]**;

- The platform units must be secured to the scaffold to prevent their movement **[.451(f)(15)(ii)]**;
- The ladder legs must be on the same platform, or other means must be provided to stabilize the ladder against unequal platform deflection **[.451(f)(15)(iii)]**;
- The ladder legs must be secured to prevent them from slipping or being pushed off the platform. **[.451(f)(15)(iv)]**.

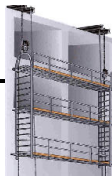
Non-mandatory Guidelines for Two-point Suspended Platforms. Ladder-type platforms must have:

- Side stringers of clear straight-grained spruce, tied together with tie rods at least $\frac{1}{4}$ " in diameter, passing through the stringers and riveted up tight against washers on both ends;
- Straight-grained oak, ash or hickory rungs at least $1\frac{7}{8}$ " in diameter, with $\frac{7}{8}$ " tenons mortised into the side stringers at least $\frac{7}{8}$ ";
- Flooring strips spaced apart no more than $\frac{5}{8}$ ", (side rails may be up to 1" apart) **[1926 Subpart L Appendix A (p)(3)]**.
- All ladder-type platforms must be constructed in accordance with this table.

Plank-type platforms must have:

- Unspliced planks no smaller than nominal 2 x 8", connected on the underside with cleats beginning 6" from each end and spaced every 4' or less;
- A bar or other means securely fastened to each end of the platform to prevent it slipping off the hanger; and
- No more than a 10 foot span between hangers **[1926 Subpart L Appendix A(p)(4)]**.

Beam-type platforms must have side stringers of lumber no smaller than 2 x 6" set on edge. Floor boards must be laid flat and spaced no more than $\frac{1}{2}$ " apart, set snugly into the upper edge of the stringers, and securely nailed to 2 x 6" cross beams at intervals of no less than 4'. There cannot be no more than a 12'



span between hangers [1926 Subpart L Appendix A (p)(5)].

Working Distance. For most activities, there must be no more than a 14" gap between the scaffold platform and the structure being worked on. On lathing and plastering, a gap of 18" is permitted [.451(b)(3) and (b)(3)(ii)].

Overlap. To prevent slippage, platforms must be cleated or otherwise restrained at each end or else overlap the centerline support at least 6" [.451(b)(4)].

Unless it is designed and installed to support employees and materials without slipping, or had guardrails that block employee access, each end of a platform may not extend over its support more than 12" (for platforms 10' or shorter in length) or more than 18" (for platforms more than 10' long) [.451(b)(5)].

On scaffolds where platforms are overlapped to create a long platform, the overlap may only occur over supports, and may not be less than 12", unless the platforms are restrained (i.e. nailed together) to prevent movement [.451(b)(7)].

On scaffolds where platforms are abutted to create a long platform, each abutted end must rest on a separate support surface [.451(b)(6)]. (This does not preclude the use of shared support members such as "T" sections, hook-on platforms that rest on common supports, etc.)

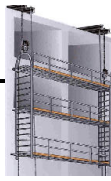
When platforms must overlap because a scaffold changes direction, such as turning a corner, platforms that rest on a bearer at an angle other than a right angle shall be laid first and platforms that rest at right angles over the same bearer shall be laid second, on top of the first platform [.451(b)(8)].

Brackets. When brackets are used to support cantilevered platforms, they must:

- Be seated with side-brackets parallel to the frames, and end-brackets at 90° to the frames [.451(c)(5)(i)].
- 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 other loads [.451(c)(5)(iii)].

Capacity. Scaffold platforms must be able to support their own weight plus four times the maximum intended load [.451(a)(1)]. Do not load the scaffold or any component parts beyond their maximum capacity (their own weight and 4:1 the maximum intended load). A scaffold can be overloaded by:

- Too many people being on the platform;



- Too much material being stored on the platform; and
- Point loading, or concentrating too much of the load in one area
[.451(f)(1)].
- Platforms must not deflect more than $\frac{1}{60}$ th of the span when loaded. (For more on planking, see the “Platform” part of this manual’s “Supported Scaffolds” section.)

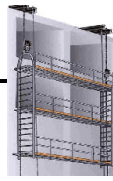
Falling Object Protection. There are 2 (two) kinds of falling object hazards associated with scaffolds. One concerns the employees on the scaffold itself while the other concerns employees who may work in or enter the area below the scaffold.

Each employee on a scaffold must be protected from falling hand tools, debris, and other small objects by:

- Hard hats;
- Toeboards, screens, or guardrail systems;
- Debris nets or canopy structures that contain or deflect falling objects; and
- Placement of potential falling objects away from the edge of the surface from which they may fall when the falling objects are too large, heavy, or massive to be contained or deflected by any of the above-listed measures
[.451(h)(1)].

Where there is a danger of tools, materials, or equipment falling from a scaffold to employees below, they must be protected by:

- The area below the scaffold being barricaded so employees are not permitted to enter; or
- Toeboards being installed along the edge of platforms more than 10' above lower levels.
- Where tools, materials, or equipment are piled to a height higher than the top edge of the toeboard, they should be prevented from falling by paneling or screening extending from the toeboard to the top of the guardrail; or
- A guardrail system shall be installed with openings small enough to contain the objects; or



- A canopy structure, debris net, or catch platform strong enough to withstand the impact of the potential falling objects shall be erected over the employees **[.451(h)(2)]**.

When toeboards are used for falling object protection, they must be:

- Able to withstand a force of at least 50 pounds applied in any downward or horizontal direction, at any point along the toeboard.
- At least 3¹/₂" high from the top edge to the level of the walking/working surface.
- Securely fastened in place at the outermost edge of the platform, and not have more than 1/4" clearance above the walking/working surface.
- Solid, or with openings not over 1" **[.451(h)(4)]**. (See Appendix A of Subpart L for non-mandatory toeboard guidelines.)

Stability.

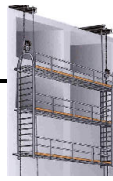
Even if a suspended scaffold has been assembled in compliance with every applicable standard, employers, and workers must continue to exercise caution and use sound work practices to assure their safety. Extreme weather, excessive loads, or damage to structural components can all affect a scaffold's stability.

Tying. Two-point suspension scaffolds must be tied or otherwise secured to prevent them from swaying, as determined to be necessary by a competent person **[.451(d)(18)]**. Window cleaners' anchors may not be used for this purpose **[.451(d)(18)]**. In addition to direct connections to buildings (except window cleaners' anchors), acceptable ways to prevent scaffold sway include angulated roping and static lines **[1926 Appendix A Part 2 (p)(1)]**.



Loading. No more than two employees should occupy suspension scaffolds designed for a working load of 500 pounds (non-mandatory) and no more than three employees should occupy suspension scaffolds designed for a working load of 750 pounds (non-mandatory) **[1926 Subpart L Appendix A Part 2 (p)(2)]**.

Inspection. Scaffolds and scaffold components must be inspected for visible defects before each shift by a competent person, and after each occurrence that



could affect a scaffold's integrity (such as being hit by a crane) **[.451(f)(3)]**. Any part of a scaffold that has been damaged or weakened so that it no longer meets OSHA strength requirements must either be repaired, replaced, braced, or removed from service **[.451(f)(4)]**.

Moving Scaffolds. Scaffolds may not be moved horizontally while employees are on them unless they have been designed for that purpose by a registered professional engineer, or in the case of mobile scaffolds, where the provisions of **926.452(w)** are followed. Two-point suspension scaffolds shall not be bridged or otherwise connected to another during raising and lowering operations unless the bridge connections are articulated (attached) and the hoists properly sized **[.452(p)(5)]**.

Weather. Employees are not permitted to work on scaffold or from a scaffold during storms or high wind unless a competent person has determined that it is safe and those employee are protected by:

- Personal fall-arrest systems, or
- Wind screen (when windscreens are used the scaffold must be secured against the anticipated wind forces) **[.451(f)(12)]**.

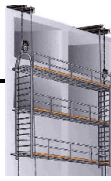
Employees are prohibited from working on scaffolds with snow, ice, or other slippery materials, except as necessary for removal of such items **[.451(f)(8)]**.

Electrical Hazards

Suspended scaffolds are often made of metal and sometimes used in close proximity to overhead power lines. These factors introduce the risk of electrocution. However, proper clearance and maintenance reduce this risk.

Overhead Power Lines. Scaffolds must not be close enough to overhead power lines that they, or any conductive materials (e.g. building materials, paint roller extensions, scaffold components) that may be handled on them, come closer than 10' to the power line. The exception is that insulated power lines of less than 300 volts have a safe distance of only 3'. (**TIP:** Because it may be difficult to determine if a power line is insulated, or what its exact voltage is, the 10' rule should always be applied.)





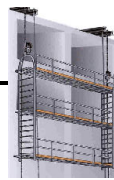
Scaffolds may be closer to overhead power lines than specified above if such proximity is necessary for the type of work being done and if the power company or electrical system operator has been notified and has either:

- De-energized the lines;
- Relocated the lines; or
- Installed protective coverings to prevent accidental contact with the lines **[.451(f)(6)]**.

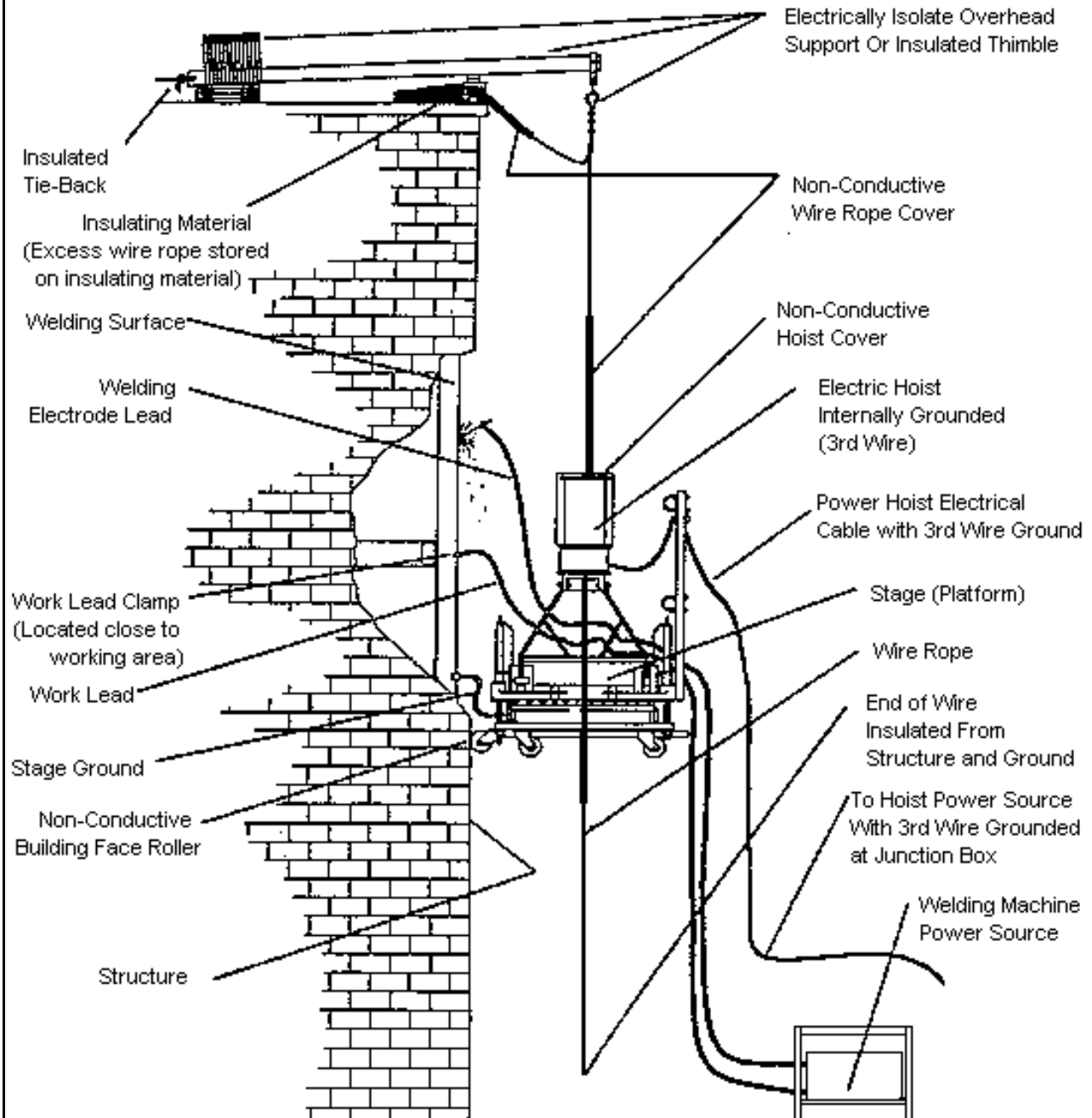
Welding. When welding is being performed from suspended scaffolds, the following precautions must be taken, as they apply, to reduce the possibility of welding current arcing through the suspension wire ropes **[.451(f)(17)]**:

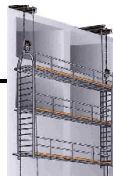
- An insulated thimble must be used to attach each suspension wire rope to its hanging support (such as cornice hook or outrigger). Excess suspension wire rope and any additional independent lines from grounding must also be insulated **[.451(f)(17)(i)]**;
- The suspension wire rope must be covered with insulating material at least 4' (1.2 m) above the hoist **[.451(f)(17)(ii)]**;
- If there is a tail line below the hoist, it must be insulated to prevent contact with the platform. The portion of the tail line that hangs free below the scaffold must be guided or retained, or both, so that it does not become grounded **[.451(f)(17)(ii)]**;
- Each hoist must be covered with insulated protective covers; **[.451(f)(17)(iii)]**;
- In addition to a work lead attachment required by the welding process, a grounding conductor must be connected from the scaffold to the structure. The size of this conductor must be at least the size of the welding process work lead, and this conductor must not be in series with the welding process or the work piece **[.451(f)(17)(iv)]**;
- An active welding rod or uninsulated welding lead must not be allowed to contact the scaffold or its suspension system **[.451(f)(17)(vi)]**; and
- If the scaffold grounding lead is disconnected at any time, the welding machine must be shut off **[.451(f)(17)(v)]**.

Subpart L Appendix E, Figure 2, contains an illustrated diagram of welding precautions for a suspended scaffold platform. See next page –



SUSPENDED SCAFFOLD PLATFORM WELDING PRECAUTIONS



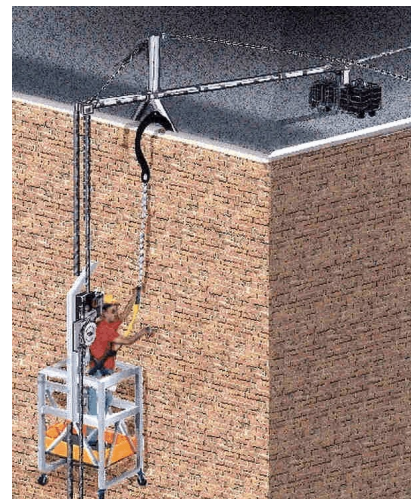


Portable Electric Tools. Because metal frame scaffolds are conductive, power tools, cords, etc. that suffer insulation failure can electrify the entire scaffold. This poses a risk of electrocution, not just to the worker holding the tool, but to everyone who contact the scaffold. Therefore, all portable electric equipment must be protected by GFCIs (ground-fault circuit interrupters) or an AEGCP (assured equipment grounding conductor program) in accordance with 1926.404(b)(1)(i).

TIP: Often, a worker who is shocked survives the current, only to lose balance and be killed in a fall. This is one more reason for always using fall protection.

SINGLE-POINT ADJUSTABLE SCAFFOLD

A single-point adjustable scaffold consists of a platform suspended by one rope from an overhead support and equipped with means to permit the movement of the platform to desired work levels. The most common among these is the scaffold used by window washers to clean the outside of a skyscraper (also known as a boatswain's chair). The following requirements apply to this scaffold type only.

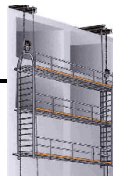


General Requirements. The supporting rope between the scaffold and the suspension device must be kept vertical unless:

- The rigging has been designed by a qualified person [.452(o)(2)(i)];
- The scaffold is accessible to rescuers [.452(o)(2)(ii)];
- The support rope is protected from rubbing during direction changes [.452(o)(2)(iii)]; and
- The scaffold is positioned so swinging cannot bring it into contact with other surfaces [.452(o)(2)(iv)].

When combining two single-point scaffolds to form a two-point suspension system, the resulting scaffold must comply with 1926.452(p) requirements [.452(o)(1)].

Non-mandatory Guidelines. The maximum intended load for these single-point adjustable suspension scaffolds is 250 lbs [1926 Subpart L Appendix A(o)].



BOATSWAIN'S CHAIRS

Boatswain's chair tackle must consist of correct-size ball bearings or bushed blocks containing safety hooks and properly eye-spliced first-grade manila rope, or other rope of equivalent strength, durability, etc. [.452(o)(3)]. Seat slings must pass through four corner holes in the seat, cross on the underside of the seat, be rigged to prevent slippage which could cause the chair to be out-of-level [.452(o)(4)], and be at least $\frac{5}{8}$ " diameter fiber, synthetic, or other first-grade manila rope of equivalent criteria (strength, slip resistance, durability, etc.) [.452(o)(5)]. Seat slings used for gas or arc welding must be made of at least $\frac{3}{8}$ " wire rope [.452(o)(6)]. Non-cross-laminated wood chairs must be reinforced on the underside with cleats to keep the board from splitting [.452(o)(7)].

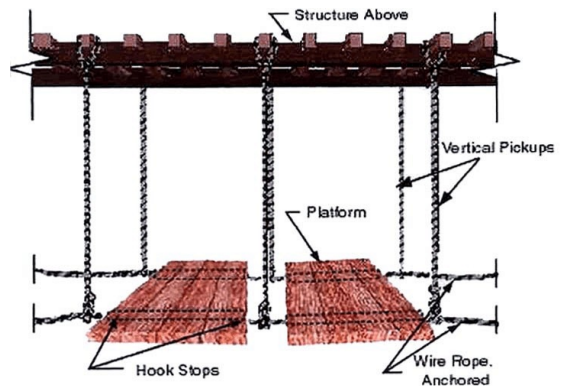
Non-mandatory Guidelines. Wood seats for boatswain's chairs must be not less than 1" thick (if made of non-laminated wood) or $\frac{5}{8}$ " thick (if made of marine-quality plywood) [1926 Subpart L Appendix A (o)].

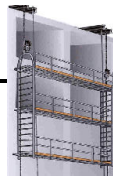
CATENARY SCAFFOLD

A catenary scaffold is a scaffold consisting of a platform supported by two essentially horizontal and parallel ropes attached to structural members of a building or other structure.

General Requirements. Catenary scaffolds may not have more than one platform between consecutive vertical pickups and more than two platforms altogether [.452(r)(1)]. Platforms supported by wire rope must have hook-shaped stops on each of the platform to prevent them from slipping off the wire ropes. These hooks must be positioned so that they prevent the platform from falling if one of the horizontal wire ropes breaks [.452(r)(2)]. Wire ropes must not be over-tightened to the point that a scaffold load will overstress them [.452(r)(3)]. Wire ropes must be continuous and without splices between anchors [.452(r)(4)].

Each employee on a catenary scaffold must be protected by a personal fall-arrest system [.451(g)(1)(i)].



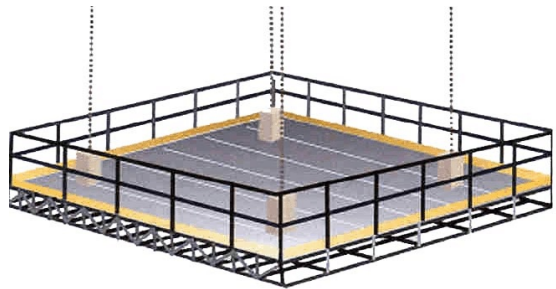


Non-mandatory Guidelines.

- Catenary scaffolds have a maximum intended load of 500 pounds [1926 Subpart L Appendix A(r)(1)].
- No more than two employees at a time are permitted on a catenary scaffold [1926 Subpart L Appendix A(r)(2)].
- Maximum capacity of come-along is 2,000 pounds [1926 Subpart L Appendix A r)(3)].
- Vertical pickups must be spaced no more than 50 feet apart [1926 Subpart L Appendix A(r)(4)].
- Ropes must be equivalent in strength to at least $\frac{1}{2}$ " diameter improved plow steel wire rope [1926 Subpart L Appendix A(r)(5)].

MULTI-POINT ADJUSTABLE SCAFFOLD

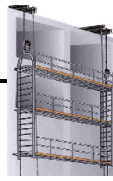
A multi-point adjustable scaffold consists of a platform (or platforms) suspended by more than two ropes from overhead supports and equipped with means to raise and lower the platform(s) to desired work levels. An example of this type of scaffold is a chimney hoist used in chimney-cleaning operations.



General Requirements. Multi-point adjustable scaffolds must be suspended from metal outriggers, brackets, wire rope slings, hooks, or means that meet equivalent criteria for strength, durability, etc. [.452(q)(3)]. When two or more scaffolds are used, they must not be bridged together unless their design allows them to be connected, the bridge connections are articulated, and the hoists are properly sized. [.452(q)(1)]. If bridges are not used, passage between platforms can be made only when they are at the same height and are abutting [.452(q)(2)].

Non-mandatory Guidelines. The following guidelines apply only to masons' multi-point adjustable suspension scaffolds:

- For a maximum intended load of 50 pounds per square foot, each outrigger beam must be at least a standard 7", 15', 15.3 pound steel I-beam [1926 Subpart L Appendix A(q)(2)].



- Beams must not project more than 6' 6" beyond the bearing point [1926 Subpart L Appendix A(q)(2)].
- Overhangs exceeding 6' 6" must be composed of stronger outrigger beams or multiple beams [1926 Subpart L Appendix A(q)(2)].

INTERIOR HUNG SCAFFOLD

An interior hung suspension scaffold consists of a platform suspended from the ceiling or roof structure by fixed-length supports.

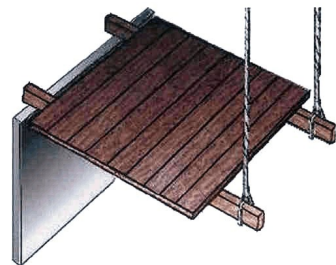


General Requirements. Interior hung scaffolds must be suspended from roof structures (e.g., ceiling beams) [.452(t)(1)]. The roof structures must be inspected for strength before scaffolds are erected [.452(t)(2)]. Suspension ropes/cables must be connected to overhead supports by shackles, clips, thimbles, or equivalent means [.452(t)(3)].

Non-mandatory Guidelines. Bearers must have dimensions of 2 x 10' and be used on edge. For an intended maximum load of 25 to 50 lbs. per square foot, the maximum span is 10'. For an intended maximum load of 75 lbs. per square foot, the maximum span is 7'. [1926 Subpart L Appendix A(t)].

NEEDLE BEAM SCAFFOLD

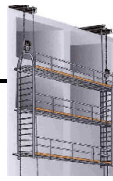
This simple type of scaffold consists of a platform suspended from needle beams, usually attached on one end to a permanent structural member.



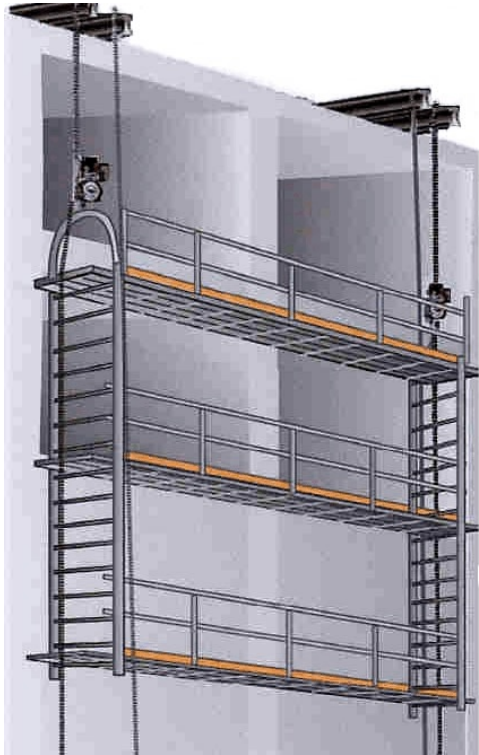
General Requirements. Scaffold support beams must be installed on edge [.452(u)(1)]. Ropes or hangers must be used for supports (Exception: One end of the scaffold may be supported by a permanent structural member.)

[.452(u)(2)]. Ropes must be securely attached to needle beams [.452(u)(3)]. Support connections must be arranged to prevent the needle beam from rolling or becoming displaced [.452(u)(4)]. Platform units must be attached by bolts or equivalent means. Cleats and overhang are not considered adequate means of attachment [.452(u)(5)].

Non-mandatory Guidelines. For a maximum intended load of 25 pounds per square foot, beams must be 4 x 6" in cross section with a maximum beam span of



10' and the platform span must be no more than 8'. Ropes must be attached to the needle beam by a scaffold hitch or eye splice, and the loose end must be tied by a bowline knot or a round turn and a half hitch [1926 Subpart L Appendix A(u)(1)]. Rope strength must at least be equal to 1" diameter, first-grade manila rope [1926 Subpart L Appendix A(u)(2)].



MULTI-LEVEL SCAFFOLD

A multi-level scaffold is a two-point or multi-point adjustable suspension scaffold with a series of platforms at various levels resting on common stirrups.

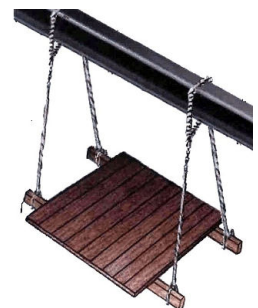
General Requirements. Multi-level suspended scaffolds must be equipped with additional independent support lines that are equal in number to the number of points supported, equal in strength to the suspension ropes, and rigged to support the scaffold if the suspension ropes fail [.452(v)(1)]. Independent support lines and suspension ropes must not be anchored to the same points [.452(v)(2)]. Supports for platforms must be attached directly to support stirrups (not to other platforms) [.452(v)(3)].

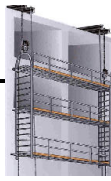
FLOAT (SHIP) SCAFFOLD

A float, or ship, scaffold is a suspension scaffold consisting of a braced platform resting on two parallel bearers and hung from overhead supports by ropes of fixed length.

General Requirements. Platforms must be supported by and securely fastened to a minimum of two bearers extending at least 6" beyond the platform on both sides [.452(s)(1)] and rope connections must not allow the platform to shift or slip [.452(s)(2)]. When only two ropes are used with each float [.452(s)(3)]:

- Ropes must be arranged to provide four ends that are securely fastened to overhead supports

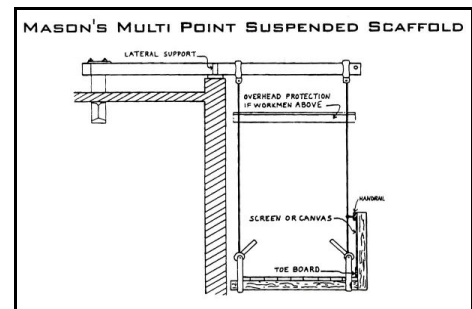
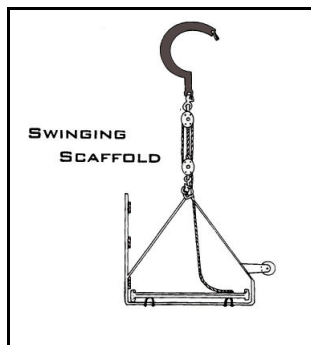
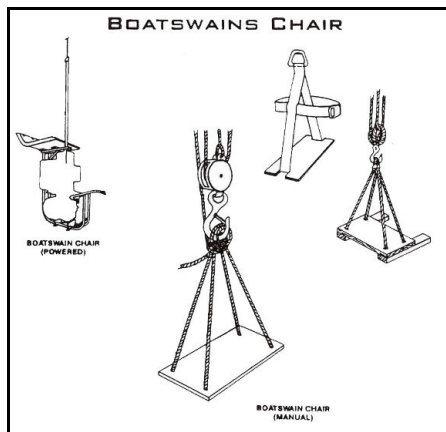




[1926.452(s)(3)(i)], and

- Each rope must:
 - Be hitched to one end of the bearer;
 - Pass under the platform and be hitched again at the other end; and
 - Leave enough rope for supporting ties [1926.452(s)(3)(ii)].
- Each employee on a float (ship) scaffold must be protected by a personal fall-arrest system [1926.451(g)(1)(i)].

Non-mandatory Guidelines. For a maximum intended load of 750 pounds platforms must be made of $\frac{3}{4}$ " plywood [1926 Subpart L Appendix A(s)(2)], bearers must be made from 2 x 4" or 1 x 10" rough lumber and free of knot and flaws [1926 Subpart L Appendix A(s)(3)], and ropes must have strength equivalent to at least 1" diameter, first-grade manila rope [1926 Subpart L Appendix A(s)(4)].





SCAFFOLD USER AERIAL LIFTS

Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to job-sites above ground [1926.453(a)(1)] – hereafter referred to as “.453”:

- Extension boom platforms [.452(a)(1)(i)];
- Aerial ladders [.452(a)(1)(ii)];
- Articulating boom platforms [.452(a)(1)(iii)];
- Vertical Towers [.452(a)(1)(iv)]; and
- A combination of any such devices [.452(a)(1)(v)].

Aerial equipment may be made of metal, wood, fiberglass reinforced plastic (FRP), or other material. They may be powered or manually operated. They are considered to be aerial lifts whether or not they are capable of rotating about a substantially vertical axis [.453(a)(1)(v)]. Aerial lifts can be “field modified” for uses other than those intended by the manufacturer provided that modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2-1969, .453, and to be at least as safe as the equipment before modification [.453(a)(2)].

Specific Requirements.

Ladder Trucks and Tower Trucks. Aerial ladders shall be secured in the lower traveling position by the locking device on top of the truck cab and the manually operated device at the base of the ladder before the truck is moved for highway travel [.453(b)(1)].



Extensible and Articulating Boom Platforms. Lift controls shall be tested each day prior to use to determine that the controls are in safe working condition **[.453(b)(2)(i)]**. At work:

- Only authorized persons shall operate an aerial lift **[.453(b)(2)(ii)]**;
- Belting off to an adjacent pole, structure, or equipment while working from the aerial lift shall not be permitted **[.453(b)(2)(iii)]**;
- Employees shall always stand firmly on the floor of the basket and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for work position **[.453(b)(2)(iv)]**;
- A body belt shall be worn and a lanyard attached to the boom or basket when working from an aerial lift – **Note:** As of 1/1/1998, body belts are not acceptable as part of a personal fall-arrest system. A body belt can be used as a part of a tethering system or a restraint system and is regulated under 1926.502(e) **[.453(b)(2)(v)]**;
- Boom and basket load limits specified by the manufacturer shall not be exceeded **[.453(b)(2)(vi)]**;
- Brakes shall be set and when outriggers are used they shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline, provided they can be safely installed **[.453(b)(2)(vii)]**;
- An aerial lift truck shall not be moved when the boom is elevated in a working position with workers in the basket except for specifically designed equipment which meet the provisions of paragraphs (a)(1) and (2) **[.453(b)(2)(viii)]**;
- Articulating boom and extensible boom platforms primarily designed as personnel carriers, shall have both platform upper and lower controls. Upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the employee in the lift – except in the case of an emergency **[.453(b)(2)(ix)]**;
- Climbers shall not be worn while performing work from an aerial lift **[.453(b)(2)(x)]**;
- The insulated portion of the aerial lift shall not be altered in any manner that might reduce its insulating value **[.453(b)(2)(xi)]**; and



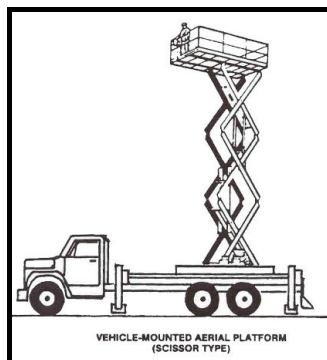
- Before moving an aerial lift for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position except as provided by paragraph (b)(2)(viii) of this paragraph [.453(b)(2)(xii)].

Electrical Tests. All electrical tests shall conform to the requirements of ANSI A92.2-1969 section 5. However, equivalent DC voltage tests may be used in lieu of the ac voltage specified in A92.2-1969. DC voltage tests which are approved by the equipment manufacturer or equivalent entity shall be considered an equivalent test for the purpose of this paragraph (b)(3) [.453(b)(3)].

Bursting Safety Factor. Bursting Safety Factor (ANSI A92.2-1969) shall apply to all critical hydraulic and pneumatic components. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All non-critical components shall have a bursting safety factor of at least 2 to 1 [.453(b)(4)].

Welding. All welding shall conform to the following standards as applicable:

- Standard Qualification Procedure AWS B3.0-41 [.452(b)(5)(i)];
- Recommended Practices for Automotive Welding Design AWS D8.4-61 [.453(b)(5)(ii)];
- Standard Qualification of Welding Procedures and Welders for Piping and Tubing AWS D10.9-69 [.453(b)(5)(iii)]; and
- Specifications for Welding Highway and Railway Bridges AWS D2.0-69 [.43(b)(5)iv]. **Note to 1926.453:** Non-mandatory Appendix C to this subpart lists examples of national consensus standards that are considered to provide employee protection equivalent to that provided through the application of ANSI A02.2-1969, where appropriate....







SCAFFOLD USER

SUBPART L*

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1926.454 Training Requirements

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(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	150
(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 retain each employee so that the requisite proficiency is regained. Retraining is required in at least the following situations	151



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Part Number:	1926
Part Title:	Safety and Health Regulations for Construction
Subpart:	L
Subpart Title:	Scaffolds
Standard Number:	1926.450
Title:	Scope, application 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 stonemasons' 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.

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Part Title:	Safety and Health Regulations for Construction
Subpart:	L
Subpart Title:	Scaffolds
Standard Number:	1926.451
Title:	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 demonstration 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)(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 feasible, 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)(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 from falling.

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)(4)

Each end of a platform, unless cleated or otherwise restrained by hooks or equivalent means, shall extend over the centerline of its support at least 6 inches (15 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)(5)(ii)

Each platform greater than 10 feet in length shall not extend over its support more than 18 inches (46 cm), unless it is designed and installed so that the cantilevered portion of the platform is able to support employees without tipping, or has guardrails which block employee access to the cantilevered end.

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)

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)

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(d)

"Criteria for suspension scaffolds."

1926.451(d)(1)

All suspension scaffold support devices, such as outrigger beams, cornice hooks, parapet clamps, and similar devices, shall rest on surfaces capable of supporting at least 4 times the load imposed on them by the scaffold operating at the rated load of the hoist (or at least 1.5 times the load imposed on them by the scaffold at the stall capacity of the hoist, whichever is greater).

1926.451(d)(2)

Suspension scaffold outrigger beams, when used, shall be made of structural metal or equivalent strength material, and shall be restrained to prevent movement.

1926.451(d)(3)

The inboard ends of suspension scaffold outrigger beams shall be stabilized by bolts or other direct connections to the floor or roof deck, or they shall have their inboard ends stabilized by counterweights, except masons' multi-point adjustable suspension scaffold outrigger beams shall not be stabilized by counterweights.

1926.451(d)(3)(i)

Before the scaffold is used, direct connections shall be evaluated by a competent person who shall confirm, based on the evaluation, that the supporting surfaces are capable of supporting the loads to be imposed. In addition, masons' multi-point adjustable suspension scaffold connections shall be designed by an engineer experienced in such scaffold design.

1926.451(d)(3)(ii)

Counterweights shall be made of non-flowable material. Sand, gravel and similar materials that can be easily dislocated shall not be used as



counterweights.

1926.451(d)(3)(ii)

Only those items specifically designed as counterweights shall be used to counterweight scaffold systems. Construction materials such as, but not limited to, masonry units and rolls of roofing felt, shall not be used as counterweights.

1926.451(d)(3)(iv)

Counterweights shall be secured by mechanical means to the outrigger beams to prevent accidental displacement.

1926.451(d)(3)(v)

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

1926.451(d)(3)(vi)

Outrigger beams which are not stabilized by bolts or other direct connections to the floor or roof deck shall be secured by tiebacks.

1926.451(d)(3)(vii)

Tiebacks shall be equivalent in strength to the suspension ropes.

1926.451(d)(3)(viii)

Outrigger beams shall be placed perpendicular to its bearing support (usually the face of the building or structure). However, where the employer can demonstrate that it is not possible to place an outrigger beam perpendicular to the face of the building or structure because of obstructions that cannot be moved, the outrigger beam may be placed at some other angle, provided opposing angle tiebacks are used.

1926.451(d)(3)(ix)

Tiebacks shall be secured to a structurally sound anchorage on the building or structure. Sound anchorages include structural members, but do not include standpipes, vents, other piping systems, or electrical conduit.

1926.451(d)(3)(x)

Tiebacks shall be installed perpendicular to the face of the building or structure, or opposing angle tiebacks shall be installed. Single tiebacks installed at an angle are prohibited.

1926.451(d)(4)

Suspension scaffold outrigger beams shall be:

1926.451(d)(4)(i)

Provided with stop bolts or shackles at both ends;

1926.451(d)(4)(ii)

Securely fastened together with the flanges turned out when channel iron



beams are used in place of I-beams;

1926.451(d)(4)(iii)

Installed with all bearing supports perpendicular to the beam center line;

1926.451(d)(4)(iv)

Set and maintained with the web in a vertical position; and

1926.451(d)(4)(v)

When an outrigger beam is used, the shackle or clevis with which the rope is attached to the outrigger beam shall be placed directly over the center line of the stirrup.

1926.451(d)(5)

Suspension scaffold support devices such as cornice hooks, roof hooks, roof irons, parapet clamps, or similar devices shall be:

1926.451(d)(5)(i)

Made of steel, wrought iron, or materials of equivalent strength;

1926.451(d)(5)(ii)

Supported by bearing blocks; and

1926.451(d)(5)(iii)

Secured against movement by tiebacks installed at right angles to the face of the building or structure, or opposing angle tiebacks shall be installed and secured to a structurally sound point of anchorage on the building or structure. Sound points of anchorage include structural members, but do not include standpipes, vents, other piping systems, or electrical conduit.

1926.451(d)(5)(iv)

Tiebacks shall be equivalent in strength to the hoisting rope.

1926.451(d)(6)

When winding drum hoists are used on a suspension scaffold, they shall contain not less than four wraps of the suspension rope at the lowest point of scaffold travel. When other types of hoists are used, the suspension ropes shall be long enough to allow the scaffold to be lowered to the level below without the rope end passing through the hoist, or the rope end shall be configured or provided with means to prevent the end from passing through the hoist.

1926.451(d)(7)

The use of repaired wire rope as suspension rope is prohibited.

1926.451(d)(8)

Wire suspension ropes shall not be joined together except through the use of eye splice thimbles connected with shackles or coverplates and bolts.



1926.451(d)(9)

The load end of wire suspension ropes shall be equipped with proper size thimbles and secured by eyesplicing or equivalent means.

1926.451(d)(10)

Ropes shall be inspected for defects by a competent person prior to each workshift and after every occurrence which could affect a rope's integrity. Ropes shall be replaced if any of the following conditions exist:

1926.451(d)(10)(i)

Any physical damage which impairs the function and strength of the rope.

1926.451(d)(10)(ii)

Kinks that might impair the tracking or wrapping of rope around the drum(s) or sheave(s).

1926.451(d)(10)(iii)

Six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay.

1926.451(d)(10)(iv)

Abrasion, corrosion, scrubbing, flattening or peening causing loss of more than one-third of the original diameter of the outside wires.

1926.451(d)(10)(v)

Heat damage caused by a torch or any damage caused by contact with electrical wires.

1926.451(d)(10)(vi)

Evidence that the secondary brake has been activated during an overspeed condition and has engaged the suspension rope.

1926.451(d)(11)

Swaged attachments or spliced eyes on wire suspension ropes shall not be used unless they are made by the wire rope manufacturer or a qualified person.

1926.451(d)(12)

When wire rope clips are used on suspension scaffolds:

1926.451(d)(12)(i)

There shall be a minimum of 3 wire rope clips installed, with the clips a minimum of 6 rope diameters apart;

1926.451(d)(12)(ii)

Clips shall be installed according to the manufacturer's recommendations;

1926.451(d)(12)(iii)

Clips shall be retightened to the manufacturer's recommendations after the initial loading;



1926.451(d)(12)(iv)

Clips shall be inspected and retightened to the manufacturer's recommendations at the start of each workshift thereafter;

1926.451(d)(12)(v)

U-bolt clips shall not be used at the point of suspension for any scaffold hoist;

1926.451(d)(12)(vi)

When U-bolt clips are used, the U-bolt shall be placed over the dead end of the rope, and the saddle shall be placed over the live end of the rope.

1926.451(d)(13)

Suspension scaffold power-operated hoists and manual hoists shall be tested by a qualified testing laboratory.

1926.451(d)(14)

Gasoline-powered equipment and hoists shall not be used on suspension scaffolds.

1926.451(d)(15)

Gears and brakes of power-operated hoists used on suspension scaffolds shall be enclosed.

1926.451(d)(16)

In addition to the normal operating brake, suspension scaffold power-operated hoists and manually operated hoists shall have a braking device or locking pawl which engages automatically when a hoist makes either of the following uncontrolled movements: an instantaneous change in momentum or an accelerated overspeed.

1926.451(d)(17)

Manually operated hoists shall require a positive crank force to descend.

1926.451(d)(18)

Two-point and multi-point suspension scaffolds shall be tied or otherwise secured to prevent them from swaying, as determined to be necessary based on an evaluation by a competent person. Window cleaners' anchors shall not be used for this purpose.

1926.451(d)(19)

Devices whose sole function is to provide emergency escape and rescue shall not be used as working platforms. This provision does not preclude the use of systems which are designed to function both as suspension scaffolds and emergency systems.



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)

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

1926.451(e)(4)(vii)

Stair rails 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)

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)

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)

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 0.4 inches (1.0 cm) for each 1 kv over 50 kv.	2 times the length of the line 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 0.4 inches (1.0 cm) for each 1 kv over 50 kv.	2 times the length of the line insulator, but never less than 10 feet (3.1 m).

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.

1926.451(f)(7)

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)

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)

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)

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)

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)

"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)

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)

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)

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 top rails 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)

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)

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)

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)

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)

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.

[44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, as amended at 58 FR 35182 and 35310, June 30, 1993; 61 FR 46025, Aug. 30 1996; 61 FR 59831, Nov. 25, 1996]



Part Number:	1926
Part Title:	Safety and Health Regulations for Construction
Subpart:	L
Subpart Title:	Scaffolds
Standard Number:	1926.452
Title:	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(a)

"Pole scaffolds."

1926.452(a)(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(a)(2)

Crossbracing shall be installed between the inner and outer sets of poles on double pole scaffolds.

1926.452(a)(3)

Diagonal bracing in both directions shall be installed across the entire inside face of double-pole scaffolds used to support loads equivalent to a uniformly distributed load of 50 pounds (222 kg) or more per square foot (929 square cm).

1926.452(a)(4)

Diagonal bracing in both directions shall be installed across the entire outside face of all double- and single-pole scaffolds.

1926.452(a)(5)

Runners and bearers shall be installed on edge.



1926.452(a)(6)

Bearers shall extend a minimum of 3 inches (7.6 cm) over the outside edges of runners.

1926.452(a)(7)

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

1926.452(a)(8)

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

1926.452(a)(9)

Where wooden poles are spliced, the ends shall be squared and the upper section shall rest squarely on the lower section. Wood splice plates shall be provided on at least two adjacent sides, and shall extend at least 2 feet (0.6 m) on either side of the splice, overlap the abutted ends equally, and have at least the same cross-sectional areas as the pole. Splice plates of other materials of equivalent strength may be used.

1926.452(a)(10)

Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer, 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 design and loading requirements for pole scaffolds under 60 feet in height.

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)

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)

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(d)

"Plasterers', decorators', and large area scaffolds." Scaffolds shall be constructed in accordance with paragraphs (a), (b), or (c) of this section, as appropriate.

1926.452(e)

"Bricklayers' square scaffolds (squares)."

1926.452(e)(1)

Scaffolds made of wood shall be reinforced with gussets on both sides of each corner.

1926.452(e)(2)

Diagonal braces shall be installed on all sides of each square.

1926.452(e)(3)

Diagonal braces shall be installed between squares on the rear and front sides of the scaffold, and shall extend from the bottom of each square to the top of the next square.

1926.452(e)(4)

Scaffolds shall not exceed three tiers in height, and shall be so constructed and arranged that one square rests directly above the other. The upper tiers shall stand on a continuous row of planks laid across the next lower tier, and shall be nailed down or otherwise secured to prevent displacement.

1926.452(f)

"Horse scaffolds."

1926.452(f)(1)

Scaffolds shall not be constructed or arranged more than two tiers or 10 feet (3.0 m) in height, whichever is less.

1926.452(f)(2)

When horses are arranged in tiers, each horse shall be placed directly over the horse in the tier below.

1926.452(f)(3)

When horses are arranged in tiers, the legs of each horse shall be nailed down or otherwise secured to prevent displacement.

1926.452(f)(4)

When horses are arranged in tiers, each tier shall be crossbraced.

1926.452(g)

"Form scaffolds and carpenters' bracket scaffolds."



1926.452(g)(1)

Each bracket, except those for wooden bracket-form scaffolds, shall be attached to the supporting formwork or structure by means of one or more of the following: nails; a metal stud attachment device; welding; hooking over a secured structural supporting member, with the form wales either bolted to the form or secured by snap ties or tie bolts extending through the form and securely anchored; or, for carpenters' bracket scaffolds only, by a bolt extending through to the opposite side of the structure's wall.

1926.452(g)(2)

Wooden bracket-form scaffolds shall be an integral part of the form panel.

1926.452(g)(3)

Folding type metal brackets, when extended for use, shall be either bolted or secured with a locking-type pin.

1926.452(h)

"Roof bracket scaffolds."

1926.452(h)(1)

Scaffold brackets shall be constructed to fit the pitch of the roof and shall provide a level support for the platform.

1926.452(h)(2)

Brackets (including those provided with pointed metal projections) shall be anchored in place by nails unless it is impractical to use nails. When nails are not used, brackets shall be secured in place with first-grade manila rope of at least three-fourth inch (1.9 cm) diameter, or equivalent.

1926.452(i)

"Outrigger scaffolds."

1926.452(i)(1)

The inboard end of outrigger beams, measured from the fulcrum point to the extreme point of anchorage, shall be not less than one and one-half times the outboard end in length.

1926.452(i)(2)

Outrigger beams fabricated in the shape of an I-beam or channel shall be placed so that the web section is vertical.

1926.452(i)(3)

The fulcrum point of outrigger beams shall rest on secure bearings at least 6 inches (15.2 cm) in each horizontal dimension.



1926.452(i)(4)

Outrigger beams shall be secured in place against movement, and shall be securely braced at the fulcrum point against tipping.

1926.452(i)(5)

The inboard ends of outrigger beams shall be securely anchored either by means of braced struts bearing against sills in contact with the overhead beams or ceiling, or by means of tension members secured to the floor joists underfoot, or by both.

1926.452(i)(6)

The entire supporting structure shall be securely braced to prevent any horizontal movement.

1926.452(i)(7)

To prevent their displacement, platform units shall be nailed, bolted, or otherwise secured to outriggers.

1926.452(i)(8)

Scaffolds and scaffold components 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)

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)

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(l)

"Window jack scaffolds."

1926.452(l)(1)

Scaffolds shall be securely attached to the window opening.

1926.452(l)(2)

Scaffolds shall be used only for the purpose of working at the window opening through which the jack is placed.



1926.452(l)(3)

Window jacks shall not be used to support planks placed between one window jack and another, or for other elements of scaffolding.

1926.452(m)

"Crawling boards (chicken ladders)."

1926.452(m)(1)

Crawling boards shall extend from the roof peak to the eaves when used in connection with roof construction, repair, or maintenance.

1926.452(m)(2)

Crawling boards shall be secured to the roof by ridge hooks or by means that meet equivalent criteria (e.g., strength and durability).

1926.452(n)

"Step, platform, and trestle ladder scaffolds."

1926.452(n)(1)

Scaffold platforms shall not be placed any higher than the second highest rung or step of the ladder supporting the platform.

1926.452(n)(2)

All ladders used in conjunction with step, platform and trestle ladder scaffolds shall meet the pertinent requirements of subpart X of this part -- Stairways and Ladders, except that job-made ladders shall not be used to support such scaffolds.

1926.452(n)(3)

Ladders used to support step, platform, and trestle ladder scaffolds shall be placed, fastened, or equipped with devices to prevent slipping.

1926.452(n)(4)

Scaffolds shall not be bridged one to another.

1926.452(o)

"Single-point adjustable suspension scaffolds."

1926.452(o)(1)

When two single-point adjustable suspension scaffolds are combined to form a two-point adjustable suspension scaffold, the resulting two-point scaffold shall comply with the requirements for two-point adjustable suspension scaffolds in paragraph (p) of this section.

1926.452(o)(2)

The supporting rope between the scaffold and the suspension device shall be



kept vertical unless all of the following conditions are met:

1926.452(o)(2)(i)

The rigging has been designed by a qualified person, and

1926.452(o)(2)(ii)

The scaffold is accessible to rescuers, and

1926.452(o)(2)(iii)

The supporting rope is protected to ensure that it will not chafe at any point where a change in direction occurs, and

1926.452(o)(2)(iv)

The scaffold is positioned so that swinging cannot bring the scaffold into contact with another surface.

1926.452(o)(3)

Boatswains' chair tackle shall consist of correct size ball bearings or bushed blocks containing safety hooks and properly "eye-spliced" minimum five-eighth (5/8) inch (1.6 cm) diameter first-grade manila rope, or other rope which will satisfy the criteria (e.g., strength and durability) of manila rope.

1926.452(o)(4)

Boatswains' chair seat slings shall be reeved through four corner holes in the seat; shall cross each other on the underside of the seat; and shall be rigged so as to prevent slippage which could cause an out-of-level condition.

1926.452(o)(5)

Boatswains' chair seat slings shall be a minimum of five-eighth (5/8) inch (1.6 cm) diameter fiber, synthetic, or other rope which will satisfy the criteria (e.g., strength, slip resistance, durability, etc.) of first grade manila rope.

1926.452(o)(6)

When a heat-producing process such as gas or arc welding is being conducted, boatswains' chair seat slings shall be a minimum of three-eighth (3/8) inch (1.0 cm) wire rope.

1926.452(o)(7)

Non-cross-laminated wood boatswains' chairs shall be reinforced on their underside by cleats securely fastened to prevent the board from splitting.

1926.452(p)

"Two-point adjustable suspension scaffolds (swing stages)." The following requirements do not apply to two-point adjustable suspension scaffolds used as masons' or stonemasons' scaffolds. Such scaffolds are covered by paragraph (q) of this section.



1926.452(p)(1)

Platforms shall not be more than 36 inches (0.9 m) wide unless designed by a qualified person to prevent unstable conditions.

1926.452(p)(2)

The platform shall be securely fastened to hangers (stirrups) by U-bolts or by other means which satisfy the requirements of 1926.451(a).

1926.452(p)(3)

The blocks for fiber or synthetic ropes shall consist of at least one double and one single block. The sheaves of all blocks shall fit the size of the rope used.

1926.452(p)(4)

Platforms shall be of the ladder-type, plank-type, beam-type, or light-metal type. Light metal-type platforms having a rated capacity of 750 pounds or less and platforms 40 feet (12.2 m) or less in length shall be tested and listed by a nationally recognized testing laboratory.

1926.452(p)(5)

Two-point scaffolds shall not be bridged or otherwise connected one to another during raising and lowering operations unless the bridge connections are articulated (attached), and the hoists properly sized.

1926.452(p)(6)

Passage may be made from one platform to another only when the platforms are at the same height, are abutting, and walk-through stirrups specifically designed for this purpose are used.

1926.452(q)

"Multi-point adjustable suspension scaffolds, stonemasons' multi-point adjustable suspension scaffolds, and masons' multi-point adjustable suspension scaffolds."

1926.452(q)(1)

When two or more scaffolds are used they shall not be bridged one to another unless they are designed to be bridged, the bridge connections are articulated, and the hoists are properly sized.

1926.452(q)(2)

If bridges are not used, passage may be made from one platform to another only when the platforms are at the same height and are abutting.

1926.452(q)(3)

Scaffolds shall be suspended from metal outriggers, brackets, wire rope slings, hooks, or means that meet equivalent criteria (e.g., strength, durability).



1926.452(r)

"Catenary scaffolds."

1926.452(r)(1)

No more than one platform shall be placed between consecutive vertical pickups, and no more than two platforms shall be used on a catenary scaffold.

1926.452(r)(2)

Platforms supported by wire ropes shall have hook-shaped stops on each end of the platforms to prevent them from slipping off the wire ropes. These hooks shall be so placed that they will prevent the platform from falling if one of the horizontal wire ropes breaks.

1926.452(r)(3)

Wire ropes shall not be tightened to the extent that the application of a scaffold load will overstress them.

1926.452(r)(4)

Wire ropes shall be continuous and without splices between anchors.

1926.452(s)

"Float (ship) scaffolds."

1926.452(s)(1)

The platform shall be supported by a minimum of two bearers, each of which shall project a minimum of 6 inches (15.2 cm) beyond the platform on both sides. Each bearer shall be securely fastened to the platform.

1926.452(s)(2)

Rope connections shall be such that the platform cannot shift or slip.

1926.452(s)(3)

When only two ropes are used with each float:

1926.452(s)(3)(i)

They shall be arranged so as to provide four ends which are securely fastened to overhead supports.

1926.452(s)(3)(ii)

Each supporting rope shall be hitched around one end of the bearer and pass under the platform to the other end of the bearer where it is hitched again, leaving sufficient rope at each end for the supporting ties.

1926.452(t)

"Interior hung scaffolds."



1926.452(t)(1)

Scaffolds shall be suspended only from the roof structure or other structural member such as ceiling beams.

1926.452(t)(2)

Overhead supporting members (roof structure, ceiling beams, or other structural members) shall be inspected and checked for strength before the scaffold is erected.

1926.452(t)(3)

Suspension ropes and cables shall be connected to the overhead supporting members by shackles, clips, thimbles, or other means that meet equivalent criteria (e.g., strength, durability).

1926.452(u)

"Needle beam scaffolds."

1926.452(u)(1)

Scaffold support beams shall be installed on edge.

1926.452(u)(2)

Ropes or hangers shall be used for supports, except that one end of a needle beam scaffold may be supported by a permanent structural member.

1926.452(u)(3)

The ropes shall be securely attached to the needle beams.

1926.452(u)(4)

The support connection shall be arranged so as to prevent the needle beam from rolling or becoming displaced.

1926.452(u)(5)

Platform units shall be securely attached to the needle beams by bolts or equivalent means. Cleats and overhang are not considered to be adequate means of attachment.

1926.452(v)

"Multi-level suspended scaffolds."

1926.452(v)(1)

Scaffolds shall be equipped with additional independent support lines, equal in number to the number of points supported, and of equivalent strength to the suspension ropes, and rigged to support the scaffold in the event the suspension rope(s) fail.

1926.452(v)(2)

Independent support lines and suspension ropes shall not be attached to the



same points of anchorage.

1926.452(v)(3)

Supports for platforms shall be attached directly to the support stirrup and not to any other platform.

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)

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)

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.

1926.452(x)

"Repair bracket scaffolds."

1926.452(x)(1)

Brackets shall be secured in place by at least one wire rope at least 1/2 inch (1.27 cm) in diameter.

1926.452(x)(2)

Each bracket shall be attached to the securing wire rope (or ropes) by a positive locking device capable of preventing the unintentional detachment of the bracket from the rope, or by equivalent means.



1926.452(x)(3)

Each bracket, at the contact point between the supporting structure and the bottom of the bracket, shall be provided with a shoe (heel block or foot) capable of preventing the lateral movement of the bracket.

1926.452(x)(4)

Platforms shall be secured to the brackets in a manner that will prevent the separation of the platforms from the brackets and the movement of the platforms or the brackets on a completed scaffold.

1926.452(x)(5)

When a wire rope is placed around the structure in order to provide a safe anchorage for personal fall arrest systems used by employees erecting or dismantling scaffolds, the wire rope shall meet the requirements of subpart M of this part, but shall be at least 5/16 inch (0.8 cm) in diameter.

1926.452(x)(6)

Each wire rope used for securing brackets in place or as an anchorage for personal fall arrest systems shall be protected from damage due to contact with edges, corners, protrusions, or other discontinuities of the supporting structure or scaffold components.

1926.452(x)(7)

Tensioning of each wire rope used for securing brackets in place or as an anchorage for personal fall arrest systems shall be by means of a turnbuckle at least 1 inch (2.54 cm) in diameter, or by equivalent means.

1926.452(x)(8)

Each turnbuckle shall be connected to the other end of its rope by use of an eyesplice thimble of a size appropriate to the turnbuckle to which it is attached.

1926.452(x)(9)

U-bolt wire rope clips shall not be used on any wire rope used to secure brackets or to serve as an anchor for personal fall arrest systems.

1926.452(x)(10)

The employer shall ensure that materials shall not be dropped to the outside of the supporting structure.

1926.452(x)(11)

Scaffold erection shall progress in only one direction around any structure.

1926.452(y)

"Stilts." Stilts, when used, shall be used in accordance with the following requirements:



1926.452(y)(1)

An employee may wear stilts on a scaffold only if it is a large area scaffold.

1926.452(y)(2)

When an employee is using stilts on a large area scaffold where a guardrail system is used to provide fall protection, the guardrail system shall be increased in height by an amount equal to the height of the stilts being used by the employee.

1926.452(y)(3)

Surfaces on which stilts are used shall be flat and free of pits, holes and obstructions, such as debris, as well as other tripping and falling hazards.

1926.452(y)(4)

Stilts shall be properly maintained. Any alteration of the original equipment shall be approved by the manufacturer.

[44 FR 8577, Feb. 9, 1979; 44 FR 20940. Apr. 6, 1979, as amended at 55 FR 47687, Nov. 14, 1990; 61 FR 46025, Aug. 30, 1996]



Part Number:	1926
Part Title:	Safety and Health Regulations for Construction
Subpart:	L
Subpart Title:	Scaffolds
Standard Number:	1926.453
Title:	Aerial lifts.

1926.453(a)

"General requirements."

1926.453(a)(1)

Unless otherwise provided in this section, aerial lifts acquired for use on or after January 22, 1973 shall be designed and constructed in conformance with the applicable requirements of the American National Standards for "Vehicle Mounted Elevating and Rotating Work Platforms," ANSI A92.2-1969, including appendix. Aerial lifts acquired before January 22, 1973 which do not meet the requirements of ANSI A92.2-1969, may not be used after January 1, 1976, unless they shall have been modified so as to conform with the applicable design and construction requirements of ANSI A92.2-1969.

Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to job-sites above ground:

1926.453(a)(1)(i)

Extensible boom platforms;

1926.453(a)(1)(ii)

Aerial ladders;

1926.453(a)(1)(iii)

Articulating boom platforms;

1926.453(a)(1)(iv)

Vertical towers; and

1926.453(a)(1)(v)

A combination of any such devices. Aerial equipment may be made of metal, wood, fiberglass reinforced plastic (FRP), or other material; may be powered or manually operated; and are deemed to be aerial lifts whether or not they are capable of rotating about a substantially vertical axis.



1926.453(a)(2)

Aerial lifts may be "field modified" for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2-1969 and this section and to be at least as safe as the equipment was before modification.

1926.453(b)

"Specific requirements."

1926.453(b)(1)

Ladder trucks and tower trucks. Aerial ladders shall be secured in the lower traveling position by the locking device on top of the truck cab, and the manually operated device at the base of the ladder before the truck is moved for highway travel.

1926.453(b)(2)

Extensible and articulating boom platforms.

1926.453(b)(2)(i)

Lift controls shall be tested each day prior to use to determine that such controls are in safe working condition.

1926.453(b)(2)(ii)

Only authorized persons shall operate an aerial lift.

1926.453(b)(2)(iii)

Belting off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted.

1926.453(b)(2)(iv)

Employees shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.

1926.453(b)(2)(v)

A body belt shall be worn and a lanyard attached to the boom or basket when working from an aerial lift.

Note to paragraph (b)(2)(v): As of January 1, 1998, subpart M of this part (1926.502(d)) provides that body belts are not acceptable as part of a personal fall arrest system. The use of a body belt in a tethering system or in a restraint system is acceptable and is regulated under 1926.502(e).



1926.453(b)(2)(vi)

Boom and basket load limits specified by the manufacturer shall not be exceeded.

1926.453(b)(2)(vii)

The brakes shall be set and when outriggers are used, they shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline, provided they can be safely installed.

1926.453(b)(2)(viii)

An aerial lift truck shall not be moved when the boom is elevated in a working position with men in the basket, except for equipment which is specifically designed for this type of operation in accordance with the provisions of paragraphs (a)(1) and (2) of this section.

1926.453(b)(2)(ix)

Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls. Upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the employee in the lift, except in case of emergency.

1926.453(b)(2)(x)

Climbers shall not be worn while performing work from an aerial lift.

1926.453(b)(2)(xi)

The insulated portion of an aerial lift shall not be altered in any manner that might reduce its insulating value.

1926.453(b)(2)(xii)

Before moving an aerial lift for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position except as provided in paragraph (b)(2)(viii) of this section.

1926.453(b)(3)

Electrical tests. All electrical tests shall conform to the requirements of ANSI A92.2-1969 section 5. However equivalent d.c.; voltage tests may be used in lieu of the a.c. voltage specified in A92.2-1969; d.c. voltage tests which are approved by the equipment manufacturer or equivalent entity shall be considered an equivalent test for the purpose of this paragraph (b)(3).

1926.453(b)(4)

Bursting safety factor. The provisions of the American National Standards Institute standard ANSI A92.2-1969, section 4.9 Bursting Safety Factor shall



apply to all critical hydraulic and pneumatic components. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical components shall have a bursting safety factor of at least 2 to 1.

1926.453(b)(5)

Welding standards. All welding shall conform to the following standards as applicable:

1926.453(b)(5)(i)

Standard Qualification Procedure, AWS B3.0-41.

1926.453(b)(5)(ii)

Recommended Practices for Automotive Welding Design, AWS D8.4-61.

1926.453(b)(5)(iii)

Standard Qualification of Welding Procedures and Welders for Piping and Tubing, AWS D10.9-69.

1926.453(b)(5)(iv)

Specifications for Welding Highway and Railway Bridges, AWS D2.0-69.

Note to 1926.453: Non-mandatory Appendix C to this subpart lists examples of national consensus standards that are considered to provide employee protection equivalent to that provided through the application of ANSI A92.2-1969, where appropriate. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American National Standards Institute. Copies may be inspected at the Docket Office, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW., room N2634, Washington, DC or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

[58 FR 35182, June 30, 1993; 61 FR 46025, Aug. 30, 1996; 61 FR 59831, Nov. 25, 1996]



Part Number:	1926
Part Title:	Safety and Health Regulations for Construction
Subpart:	L
Subpart Title:	Scaffolds
Standard Number:	1926.454
Title:	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;

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)

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)

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.

[61 FR 46025, Aug. 30, 1996]



Part Number:	1926
Part Title:	Safety and Health Regulations for Construction
Subpart:	L
Subpart Title:	Scaffolds
Standard Number:	1926 Subpart L App A
Title:	Scaffold Specifications

This Appendix provides non-mandatory guidelines to assist employers in complying with the requirements of subpart L of this part. An employer may use these guidelines and tables as a starting point for designing scaffold systems. However, the guidelines do not provide all the information necessary to build a complete system, and the employer is still responsible for designing and assembling these components in such a way that the completed system will meet the requirements of 1926.451(a). Scaffold components which are not selected and loaded in accordance with this Appendix, and components for which no specific guidelines or tables are given in this Appendix (e.g., joints, ties, components for wood pole scaffolds more than 60 feet in height, components for heavy-duty horse scaffolds, components made with other materials, and components with other dimensions, etc.) must be designed and constructed in accordance with the capacity requirements of 1926.451(a), and loaded in accordance with 1926.451(d)(1).

Index to Appendix A for Subpart L

- 1. General guidelines and tables.**
- 2. Specific guidelines and tables.**
 - (a) Pole scaffolds:
 - Single-pole wood pole scaffolds.
 - Independent wood pole scaffolds.
 - (b) Tube and coupler scaffolds.
 - (c) Fabricated frame scaffolds.
 - (d) Plasterers', decorators' and large area scaffolds.
 - (e) Bricklayers' square scaffolds.
 - (f) Horse scaffolds.



- (g) Form scaffolds and carpenters' bracket scaffolds.
- (h) Roof bracket scaffolds.
- (i) Outrigger scaffolds (one level).
- (j) Pump jack scaffolds.
- (k) Ladder jack scaffolds.
- (l) Window jack scaffolds.
- (m) Crawling boards (chicken ladders).
- (n) Step, platform and trestle ladder scaffolds.
- (o) Single-point adjustable suspension scaffolds.
- (p) Two-point adjustable suspension scaffolds.
- (q)(1) Stonesetters' multi-point adjustable suspension scaffolds.
- (q)(2) Masons' multi-point adjustable suspension scaffolds.
- (r) Catenary scaffolds.
- (s) Float (ship) scaffolds.
- (t) Interior hung scaffolds.
- (u) Needle beam scaffolds.
- (v) Multi-level suspension scaffolds.
- (w) Mobile scaffolds.
- (x) Repair bracket scaffolds.
- (y) Stilts.
- (z) Tank builders' scaffolds.

1. General Guidelines and Tables

- (a) The following tables, and the tables in Part 2 -- Specific guidelines and tables, assume that all load-carrying timber members (except planks) of the scaffold are a minimum of 1,500 lb-f/in(2) (stress grade) construction grade lumber. All dimensions are nominal sizes as provided in the American Softwood Lumber Standards, dated January 1970, except that, where rough sizes are noted, only rough or undressed lumber of the size specified will satisfy minimum requirements.
- (b) Solid sawn wood used as scaffold planks shall be selected for such use following the grading rules established by a recognized lumber grading association or by an independent lumber grading inspection agency. Such planks shall be identified by the grade stamp of such association or agency. The association or agency and the grading rules under



which the wood is graded shall be certified by the Board of Review, American Lumber Standard Committee, as set forth in the American Softwood Lumber Standard of the U.S. Department of Commerce.

(i) Allowable spans shall be determined in compliance with the National Design Specification for Wood Construction published by the National Forest Products Association; paragraph 5 of ANSI A10.8-1988 Scaffolding-Safety Requirements published by the American National Standards Institute; or for 2 x 10 inch (nominal) or 2 x 9 inch (rough) solid sawn wood planks, as shown in the following table:

Maximum intended nominal load (lb/ft (2))	Maximum permissible span using full thickness undressed lumber (ft)	Maximum permissible span using nominal thickness lumber (ft)
25.....	10	8
50.....	8	6
75.....	6	

(ii) The maximum permissible span for 1 1/4 x 9-inch or wider wood plank of full thickness with a maximum intended load of 50 lb/ft.(2) shall be 4 feet.

(c) 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 being calculated as follows:



Rated load capacity	Intended load
Light-duty.....	* 25 pounds per square foot applied uniformly over the entire span area.
Medium-duty... ..	* 50 pounds per square foot applied uniformly over the entire span area.
Heavy-duty.....	* 75 pounds per square foot applied uniformly over the entire span area.
One-person.....	* 250 pounds placed at the center of the span (total 250 pounds).
Two-person.....	* 250 pounds placed 18 inches to the left and right of the center of the span (total 500 pounds).
Three-person.....	* 250 pounds placed at the center of the span and 250 pounds placed 18 inches to the left and right of the center of the span (total 750 pounds).

Note: Platform units used to make scaffold platforms intended for light-duty use shall be capable of supporting at least 25 pounds per square foot applied uniformly over the entire unit-span area, or a 250-pound point load placed on the unit at the center of the span, whichever load produces the greater shear force.

(d) Guardrails shall be as follows:

- (i) Toprails shall be equivalent in strength to 2 inch by 4 inch lumber; or
 1 1/4 inch x 1/8 inch structural angle iron; or
 1 inch x .070 inch wall steel tubing; or 1.990 inch x .058 inch wall aluminum tubing.

- (ii) Midrails shall be equivalent in strength to 1 inch by 6 inch lumber; or
 1 1/4 inch x 1 1/4 inch x 1/8 inch structural angle iron; or
 1 inch x .070 inch wall steel tubing; or
 1.990 inch x .058 inch wall aluminum tubing.

- (iii) Toeboards shall be equivalent in strength to 1 inch by 4 inch lumber; or
 1 1/4 inch x 1 1/4 inch structural angle iron; or
 1 inch x .070 inch wall steel tubing; or



1.990 inch x .058 inch wall aluminum tubing.

(iv) Posts shall be equivalent in strength to 2 inch by 4 inch lumber;
or

1 1/4 inch x 1 1/4 inch x 1/8 structural angle iron; or

1 inch x .070 inch wall steel tubing; or

1.990 inch x .058 inch wall aluminum tubing.

(v) Distance between posts shall not exceed 8 feet.

(e) Overhead protection shall consist of 2 inch nominal planking laid tight, or 3/4-inch plywood.

(f) Screen installed between toeboards and midrails or top rails shall consist of No. 18 gauge U.S. Standard wire one inch mesh.

2. Specific guidelines and tables.

(a) Pole Scaffolds.

Single Pole Wood Pole Scaffolds

	Light duty up to 20 feet high	Light duty up to 60 feet high	Medium duty up to 60 feet high	Heavy duty up to 60 feet high
Maximum intended load (lbs/ft (2))	25	25	50	75
Poles or uprights	2 x 4 in...	4 x 4 in...	4 x 4 in...	4 x 6 in.
Maximum pole spacing (longitudinal)	6 feet	10 feet	8 feet	6 feet



Maximum pole spacing (transverse).....	5 feet.....	5 feet.....	5 feet.....	5 feet
Runners.....	1 x 4 in...	1 1/4 x 9 in	2 x 10 in...	2 x 10 in.
Bearers and maximum spacing of bearers:				
3 feet.....	2 x 4 in...	2 x 4 in...	2 x 10 in..	2 x 10 in.
			or 3 x 4 in.	or 3 x 5 in.
5 feet.....	2 x 6 in. or	2 x 6 in. or	2 x 10 in. or	2 x 10 in.
	3 x 4 in...	3 x 4 in..	3 x 4 in....	or 3 x 5 in.
		(rough).		
6 feet.....	.....	.....	2 x 10 in. or	2 x 10 in.
			3 x 4 in....	or 3 x 5 in.
8 feet.....	.....	.....	2 x 10 in. or	
			3 x 4 in....	.....
Planking.....	1 1/4 x 9 in	2 x 10 in..	2 x 10 in....	2 x 10 in.
Maximum vertical spacing of horizontal members.	7 feet.....	9 feet.....	7 feet.....	6 ft. 6 in.
Bracing horizontal....	1 x 4 in....	1 x 4 in....	1 x 6 in. or	2 x 4 in.
			1 1/4 x 4 in	
Bracing diagonal..	1 x 4 in....	1 x 4 in....	1 x 4 in....	2 x 4 in.
Tie-ins.....	1 x 4 in....	1 x 4 in....	1 x 4 in....	1 x 4 in.
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Note: All members except planking are used on edge. All wood bearers shall be reinforced with 3/16 x 2 inch steel strip, or the equivalent, secured to the lower edges for the entire length of the bearer.



Independent Wood Pole Scaffolds

	Light duty up to 20 feet high	Light duty up to 60 feet high	Medium duty up to 60 feet high	Heavy duty up to 60 feet high
Maximum intended load.....	25 lbs/ft(2)	25 lbs/ft(2)	50 lbs/ft(2)	75 lbs/ft(2) .
Poles or uprights	2 x 4 in....	4 x 4 in....	4 x 4 in.....	4 x 4 in.
Maximum pole spacing (longitudinal)..	6 feet.....	10 feet.....	8 feet.....	6 feet.
Maximum (transverse)..	6 feet.....	10 feet.....	8 feet.....	8 feet.
Runners.....	1 1/4 x 4 in	1 1/4 x 9 in	2 x 10 in....	2 x 10 in.
Bearers and maximum spacing of bearers:				
3 feet.....	2 x 4 in....	2 x 4 in....	2 x 10 in....	2 x 10 in. (rough).
6 feet.....	2 x 6 in. or 3 x 4 in....	2 x 10 in.. (rough) or 3 x 8 in.	2 x 10 in....	2 x 10 in. (rough).
8 feet.....	2 x 6 in. or 3 x 4 in....	2 x 10 in.. (rough) or 3 x 8 in.	2 x 10 in....	.....
10 feet.....	2 x 6 in. or 3 x 4 in....	2 x 10 in.. (rough) or 3 x 3 in..	.....	.....
Planking.....	1 1/4 x 9 in	2 x 10 in...	2 x 10 in....	2 x 10 in.
Maximum vertical spacing of horizontal members.	7 feet.....	7 feet.....	6 feet.....	6 feet.
Bracing horizontal....	1 x 4 in....	1 x 4 in....	1 x 6 in. or 1 1/4 x 4 in.	2 x 4 in.
Bracing diagonal..	1 x 4 in....	1 x 4 in....	1 x 4 in.....	2 x 4 in.
Tie-ins.....	1 x 4 in....	1 x 4 in....	1 x 4 in.....	1 x 4 in.

Note: All members except planking are used on edge. All wood bearers shall be reinforced with 3/16 x 2 inch steel strip, or the equivalent, secured to the lower edges for the entire length of the bearer.



(b) Tube and coupler scaffolds.

Minimum Size of Members

	Light duty	Medium duty	Heavy duty
Maximum intended load.....	25 lbs/ft(2)	50 lbs/ft(2)...	75 lbs/ft(2).
Posts, runners and braces.....	Nominal 2 in. (1.90 inches) OD steel tube or pipe.	Nominal 2 in. (1.90 inches) OD steel tube or pipe.	Nominal 2 in. (1.90 inches) OD steel tube or pipe.
Bearers.....	Nominal 2 in. (1.90 inches) OD steel tube or pipe and a maximum post spacing of 4 ft. x 10 ft.	Nominal 2 in. (1.90 inches).. OD steel tube or pipe and a maximum post spacing of 4 ft. x 7 ft. or Nominal 2 1/2 in. (2.375 in.). OD steel tube or pipe and a maximum post spacing of 6 ft. x 8 ft. (*)	Nominal 2 1/2 in. (2.375 in.). OD steel tube or pipe and a maximum post spacing of 6 ft. x 6 ft.
Maximum runner spacing vertically.....	6 ft. 6 in..	6 ft. 6 in.....	6 ft. 6 in.

Footnote(*) Bearers shall be installed in the direction of the shorter dimension.

Note: Longitudinal diagonal bracing shall be installed at an angle of 45 deg. (+/- 5 deg.).



Maximum Number of Planked Levels

	Maximum number of additional planked levels			Maximum height of scaffold (in feet)
	Light duty	Medium duty	Heavy duty	
Number of Working Levels:				
1.....	16	11	6	125
2.....	11	1	0	125
3.....	6	0	0	125
4.....	1	0	0	125

(c) **"Fabricated frame scaffolds."** Because of their prefabricated nature, no additional guidelines or tables for these scaffolds are being adopted in this Appendix.

(d) **"Plasterers', decorators', and large area scaffolds."** The guidelines for pole scaffolds or tube and coupler scaffolds (Appendix A (a) and (b)) may be applied.

(e) **"Bricklayers' square scaffolds."**

Maximum intended load: 50 lb/ft.(2)(*)

Footnote(*) The squares shall be set not more than 8 feet apart for light duty scaffolds and not more than 5 feet apart for medium duty scaffolds.

Maximum width: 5 ft.

Maximum height: 5 ft.

Gussets: 1 x 6 in.

Braces: 1 x 8 in.

Legs: 2 x 6 in.

Bearers (horizontal members): 2 x 6 in.

(f) **Horse scaffolds.**

Maximum intended load (light duty): 25 lb/ft.(2)(**)

Footnote(**) Horses shall be spaced not more than 8 feet apart for light duty loads, and not more than 5 feet apart for medium duty loads.



Maximum intended load (medium duty): 50 lb/ft.(2)(**)

Footnote(**) Horses shall be spaced not more than 8 feet apart for light duty loads, and not more than 5 feet apart for medium duty loads.

Horizontal members or bearers:

Light duty: 2 x 4 in.

Medium duty: 3 x 4 in.

Legs: 2 x 4 in.

Longitudinal brace between legs: 1 x 6 in.

Gusset brace at top of legs: 1 x 8 in.

Half diagonal braces: 2 x 4 in.

(g) "Form scaffolds and carpenters' bracket scaffolds."

(1) Brackets shall consist of a triangular-shaped frame made of wood with a cross-section not less than 2 inches by 3 inches, or of 1 1/4 inch x 1 1/4 inch x 1/8 inch structural angle iron.

(2) Bolts used to attach brackets to structures shall not be less than 5/8 inches in diameter.

(3) Maximum bracket spacing shall be 8 feet on centers.

(4) No more than two employees shall occupy any given 8 feet of a bracket or form scaffold at any one time. Tools and materials shall not exceed 75 pounds in addition to the occupancy.

(5) Wooden figure-four scaffolds:

Maximum intended load: 25 lb/ft.(2)

Uprights: 2 x 4 in. or 2 x 6 in.

Bearers (two): 1 x 6 in.

Braces: 1 x 6 in.

Maximum length of bearers (unsupported): 3 ft. 6 in.

(i) Outrigger bearers shall consist of two pieces of 1 x 6 inch lumber nailed on opposite sides of the vertical support.

(ii) Bearers for wood figure-four brackets shall project not more than 3 feet 6 inches from the outside of the form support, and shall be braced and secured to prevent tipping or turning. The knee or angle brace shall intersect the bearer at least 3 feet from the form at an angle of approximately 45 degrees, and



the lower end shall be nailed to a vertical support.

(6) Metal bracket scaffolds:

Maximum intended load: 25 lb/ft.(2)

Uprights: 2 x 4 inch

Bearers: As designed.

Braces: As designed.

(7) Wood bracket scaffolds:

Maximum intended load: 25 lb/ft.(2)

Uprights: 2 x 4 in or 2 x 6 in

Bearers: 2 x 6 in

Maximum scaffold width: 3 ft 6 in

Braces: 1 x 6 in

(h) "Roof bracket scaffolds." No specific guidelines or tables are given.

(i) "Outrigger scaffolds (single level)." No specific guidelines tables are given.

(j) "Pump jack scaffolds." Wood poles shall not exceed 30 feet in height. Maximum intended load -- 500 lbs between poles; applied at the center of the span. Not more than two employees shall be on a pump jack scaffold at one time between any two supports. When 2 x 4's are spliced together to make a 4 x 4 inch wood pole, they shall be spliced with "10 penny" common nails no more than 12 inches center to center, staggered uniformly from the opposite outside edges.

(k) "Ladder jack scaffolds." Maximum intended load -- 25 lb/ft(2). However, not more than two employees shall occupy any platform at any one time. Maximum span between supports shall be 8 feet.

(l) "Window jack scaffolds." Not more than one employee shall occupy a window jack scaffold at any one time.

(m) "Crawling boards (chicken ladders)." Crawling boards shall be not less than 10 inches wide and 1 inch thick, with cleats having a minimum 1 x 1 1/2 inch cross-sectional area. The cleats shall be equal in length to the width of the board and spaced at equal intervals not to exceed 24 inches.



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- (n) **"Step, platform, and trestle ladder scaffolds."** No additional guidelines or tables are given.
- (o) **"Single-point adjustable suspension scaffolds."** Maximum intended load -- 250 lbs. Wood seats for boatswains' chairs shall be not less than 1 inch thick if made of non-laminated wood, or 5/8 inches thick if made of marine quality plywood.
- (p) **"Two-point adjustable suspension scaffolds."**
- (1) In addition to direct connections to buildings (except window cleaners' anchors) acceptable ways to prevent scaffold sway include angulated roping and static lines. Angulated roping is a system of platform suspension in which the upper wire rope sheaves or suspension points are closer to the plane of the building face than the corresponding attachment points on the platform, thus causing the platform to press against the face of the building. Static lines are separate ropes secured at their top and bottom ends closer to the plane of the building face than the outermost edge of the platform. By drawing the static line taut, the platform is drawn against the face of the building.
 - (2) On suspension scaffolds designed for a working load of 500 pounds, no more than two employees shall be permitted on the scaffold at one time. On suspension scaffolds with a working load of 750 pounds, no more than three employees shall be permitted on the scaffold at one time.
 - (3) Ladder-type platforms. The side stringer shall be of clear straight-grained spruce. The rungs shall be of straight-grained oak, ash, or hickory, at least 1 1/8 inches in diameter, with 7/8 inch tenons mortised into the side stringers at least 7/8 inch. The stringers shall be tied together with tie rods not less than 1/4 inch in diameter, passing through the stringers and riveted up tight against washers on both ends. The flooring strips shall be spaced not more than 5/8 inch apart, except at the side rails where the space may be 1 inch. Ladder-type platforms shall be constructed in accordance with the following table:



Schedule for Ladder-Type Platforms

Length of Platform.....	12 feet.....	14 & 16 feet.....	18 & 20 feet.
Side stringers, minimum cross section (finished sizes):			
At ends.....	1 3/4 x 2 3/4 in.	1 3/4 x 2 3/4 in.	1 3/4 x 3 in.
At middle.....	1 3/4 x 3 3/4 in.	1 3/4 x 3 3/4 in.	1 3/4 x 4 in.
Reinforcing strip (minimum).....	A 1/8 x 7/8 inch steel reinforcing strip shall be attached to the side or underside, full length.		
Rungs.....	Rungs shall be 1 1/8 inch minimum diameter with at least 7/8 inch in diameter tenons, and the maximum spacing shall be 12 inches to center.		
Tie rods:			
Number (minimum).....	3.....	4.....	4
Diameter (minimum).....	1/4 inch.....	1/4 inch.....	1/4 inch
Flooring, minimum finished size.....	1/2 x 2 3/4 in....	1/2 x 2 3/4 in....	1/2 x 2 3/4 in.

Schedule for Ladder-Type Platforms

Length of Platform.....	22 & 24 ft.....	28 & 30 ft.
Side stringers, minimum cross section (finished sizes):		
At ends.....	1 3/4 x 3 in.....	1 3/4 x 3 1/2 in.
At middle.....	1 3/4 x 4 1/4 in....	1 3/4 x 5 in.
Reinforcing strip (minimum).....	A 1/8 x 7/8-inch steel reinforcing strip shall be attached to the side or underside, full length.	
Rungs.....	Rungs shall be 1 1/8 inch minimum diameter with at least 7/8 inch in diameter tenons, and the maximum spacing shall be 12 inches to center.	
	Tie rods.	
Number (minimum).....	5.....	6.
Diameter (minimum).....	1/4 in.....	1/4 in.
Flooring, minimum finished size.....	1/2 x 2 3/4 in.....	1/2 x 2 3/4 in.

(4) Plank-Type Platforms. Plank-type platforms shall be composed of not less than nominal 2 x 8 inch unspliced planks, connected together on the underside with cleats at intervals not exceeding 4 feet, starting 6 inches from each end. A bar or other effective means shall be securely



fastened to the platform at each end to prevent the platform from slipping off the hanger. The span between hangers for plank-type platforms shall not exceed 10 feet.

(5) **Beam-Type Platforms.** Beam platforms shall have side stringers of lumber not less than 2 x 6 inches set on edge. The span between hangers shall not exceed 12 feet when beam platforms are used. The flooring shall be supported on 2 x 6 inch cross beams, laid flat and set into the upper edge of the stringers with a snug fit, at intervals of not more than 4 feet, securely nailed to the cross beams. Floor-boards shall not be spaced more than 1/2 inch apart.

(q)(1) "Multi-point adjustable suspension scaffolds and stonemasons' multi-point adjustable suspension scaffolds." No specific guidelines or tables are given for these scaffolds.

(q)(2) "Masons' multi-point adjustable suspension scaffolds." Maximum intended load -- 50 lb/ft². Each outrigger beam shall be at least a standard 7 inch, 15.3 pound steel I-beam, at least 15 feet long. Such beams shall not project more than 6 feet 6 inches beyond the bearing point. Where the overhang exceeds 6 feet 6 inches, outrigger beams shall be composed of stronger beams or multiple beams.

(r) "Catenary scaffolds."

- (1) Maximum intended load -- 500 lbs.
- (2) Not more than two employees shall be permitted on the scaffold at one time.
- (3) Maximum capacity of come-along shall be 2,000 lbs.
- (4) Vertical pickups shall be spaced not more than 50 feet apart.
- (5) Ropes shall be equivalent in strength to at least 1/2 inch (1.3 cm) diameter improved plow steel wire rope.

(s) "Float (ship) scaffolds."

- (1) Maximum intended load -- 750 lbs.
- (2) Platforms shall be made of 3/4 inch plywood, equivalent in rating to American Plywood Association Grade B-B, Group I, Exterior.
- (3) Bearers shall be made from 2 x 4 inch, or 1 x 10 inch rough



lumber. They shall be free of knots and other flaws.

- (4) Ropes shall be equivalent in strength to at least 1 inch (2.5 cm) diameter first grade manila rope.

(t) Interior hung scaffolds.

Bearers (use on edge): 2 x 10 in.

Maximum intended load: Maximum span

25 lb/ft.(2): 10 ft.

50 lb/ft.(2): 10 ft.

75 lb/ft.(2): 7 ft.

(u) "Needle beam scaffolds."

Maximum intended load: 25 lb/ft.(2)

Beams: 4 x 6 in.

Maximum platform span: 8 ft.

Maximum beam span: 10 ft.

- (1) Ropes shall be attached to the needle beams by a scaffold hitch or an eye splice. The loose end of the rope shall be tied by a bowline knot or by a round turn and a half hitch.

- (2) Ropes shall be equivalent in strength to at least 1 inch (2.5 cm) diameter first grade manila rope.

- (v) "Multi-level suspension scaffolds."** No additional guidelines or tables are being given for these scaffolds.

- (w) "Mobile Scaffolds."** Stability test as described in the ANSI A92 series documents, as appropriate for the type of scaffold, can be used to establish stability for the purpose of 1926.452(w)(6).

- (x) "Repair bracket scaffolds."** No additional guidelines or tables are being given for these scaffolds.

- (y) "Stilts."** No specific guidelines or tables are given.

(z) "Tank builder's scaffold."

- (1) The maximum distance between brackets to which scaffolding and guardrail supports are attached shall be no more than 10 feet 6 inches.



- (2) Not more than three employees shall occupy a 10 feet 6 inch span of scaffold planking at any time.
- (3) A taut wire or synthetic rope supported on the scaffold brackets shall be installed at the scaffold plank level between the innermost edge of the scaffold platform and the curved plate structure of the tank shell to serve as a safety line in lieu of an inner guardrail assembly where the space between the scaffold platform and the tank exceeds 12 inches (30.48 cm). In the event the open space on either side of the rope exceeds 12 inches (30.48 cm), a second wire or synthetic rope appropriately placed, or guardrails in accordance with 1926.451(e)(4), shall be installed in order to reduce that open space to less than 12 inches (30.48 cm).
- (4) Scaffold planks of rough full-dimensioned 2-inch (5.1 cm) x 12-inch (30.5 cm) Douglas Fir or Southern Yellow Pine of Select Structural Grade shall be used. Douglas Fir planks shall have a fiber stress of at least 1900 lb/in(2) (130,929 n/cm(2)) and a modulus of elasticity of at least 1,900,000 lb/in(2) (130,929,000 n/cm(2)), while Yellow Pine planks shall have a fiber stress of at least 2500 lb/in(2) (172,275 n/cm(2)) and a modulus of elasticity of at least 2,000,000 lb/in(2) (137,820,000 n/cm(2)).
- (5) Guardrails shall be constructed of a taut wire or synthetic rope, and shall be supported by angle irons attached to brackets welded to the steel plates. These guardrails shall comply with 1926.451(e)(4). Guardrail supports shall be located at no greater than 10 feet 6 inch intervals.

[61 FR 46025, Aug. 30, 1996]



Part Number: 1926
Part Title: Safety and Health Regulations for Construction
Subpart: L
Subpart Title: Scaffolds
Standard Number: 1926 Subpart L App B
Title: Criteria for Determining the Feasibility of Providing Safe Access and Fall Protection for Scaffold Erectors and Dismantlers

[Reserved]
[61 FR 46025, Aug. 30, 1996]

Part Number: 1926
Part Title: Safety and Health Regulations for Construction
Subpart: L
Subpart Title: Scaffolds
Standard Number: 1926 Subpart L App C
Title: List of National Consensus Standards.

ANSI/SIA A92.2-1990 Vehicle-Mounted Elevating and Rotating Aerial Devices
ANSI/SIA A92.3-1990 Manually Propelled Elevating Aerial Platforms
ANSI/SIA A92.5-1990 Boom Supported Elevating Work Platforms
ANSI/SIA A92.6-1990 Self-Propelled Elevating Work Platforms
ANSI/SIA A92.7-1990 Airline Ground Support Vehicle-Mounted Vertical Lift Devices
ANSI/SIA A92.8-1993 Vehicle-Mounted Bridge Inspection and Maintenance Devices
ANSI/SIA A92.9-1993 Mast-Climbing Work Platforms

[61 FR 46025, Aug. 30, 1996]



Part Number:	1926
Part Title:	Safety and Health Regulations for Construction
Subpart:	L
Subpart Title:	Scaffolds
Standard Number:	1926 Subpart L App D
Title:	List of Training Topics for Scaffold Erectors and Dismantlers.

This Appendix D is provided to serve as a guide to assist employers when evaluating the training needs of employees erecting or dismantling supported scaffolds.

The Agency believes that employees erecting or dismantling scaffolds should be trained in the following topics:

- * General Overview of Scaffolding
 - * regulations and standards
 - * erection/dismantling planning
 - * PPE and proper procedures
 - * fall protection
 - * materials handling
 - * access
 - * working platforms
 - * foundations
 - * guys, ties and braces

- * Tubular Welded Frame Scaffolds
 - * specific regulations and standards
 - * components
 - * parts inspection
 - * erection/dismantling planning
 - * guys, ties and braces
 - * fall protection
 - * general safety



- * access and platforms
- * erection/dismantling procedures
- * rolling scaffold assembly
- * putlogs

- * Tube and Clamp Scaffolds
 - * specific regulations and standards
 - * components
 - * parts inspection
 - * erection/dismantling planning
 - * guys, ties and braces
 - * fall protection
 - * general safety
 - * access and platforms
 - * erection/dismantling procedures
 - * buttresses, cantilevers, & bridges

- * System Scaffolds
 - * specific regulations and standards
 - * components
 - * parts inspection
 - * erection/dismantling planning
 - * guys, ties and braces
 - * fall protection
 - * general safety
 - * access and platforms
 - * erection/dismantling procedures
 - * buttresses, cantilevers, & bridges

Scaffold erectors and dismantlers should all receive the general overview, and, in addition, specific training for the type of supported scaffold being erected or dismantled.

[61 FR 46025, Aug. 30, 1996]



Part Number:	1926
Part Title:	Safety and Health Regulations for Construction
Subpart:	L
Subpart Title:	Scaffolds
Standard Number:	1926 Subpart L App E
Title:	Drawings and Illustrations.

This Appendix provides drawings of particular types of scaffolds and scaffold components, and graphic illustrations of bracing patterns and tie spacing patterns.

This Appendix is intended to provide visual guidance to assist the user in complying with the requirements of subpart L, part 1926.

Figure 1.

BRACING - TUBE & COUPLER SCAFFOLDS

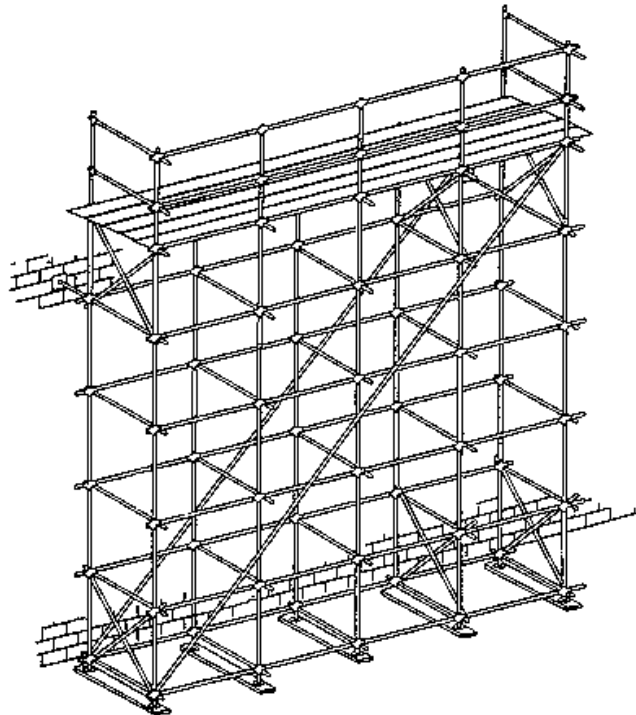




Figure 2.

SUSPENDED SCAFFOLD PLATFORM WELDING PRECAUTIONS

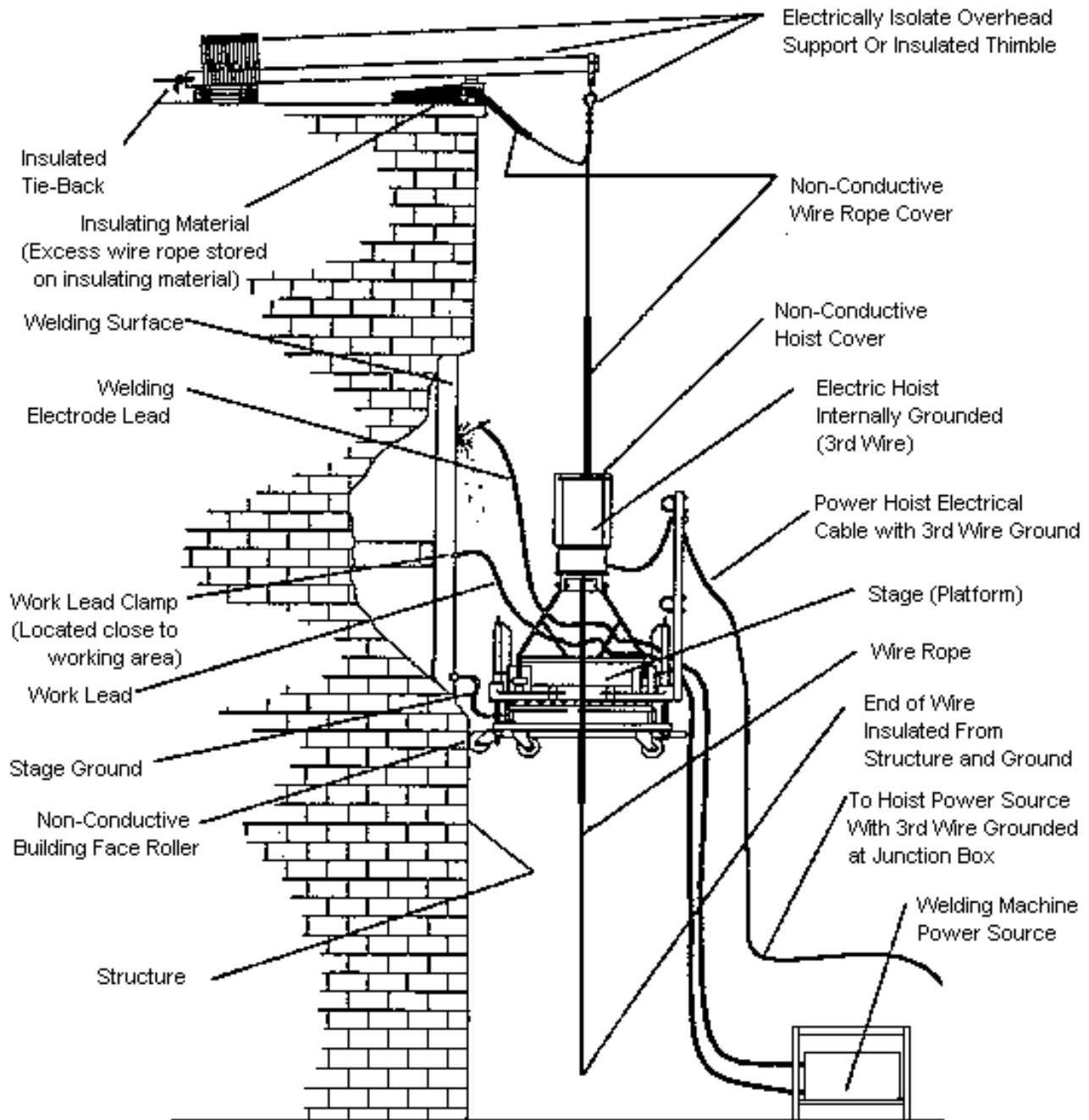




Figure 3.

MAXIMUM VERTICAL TIE SPACING WIDER THAN 3'-0" BASES

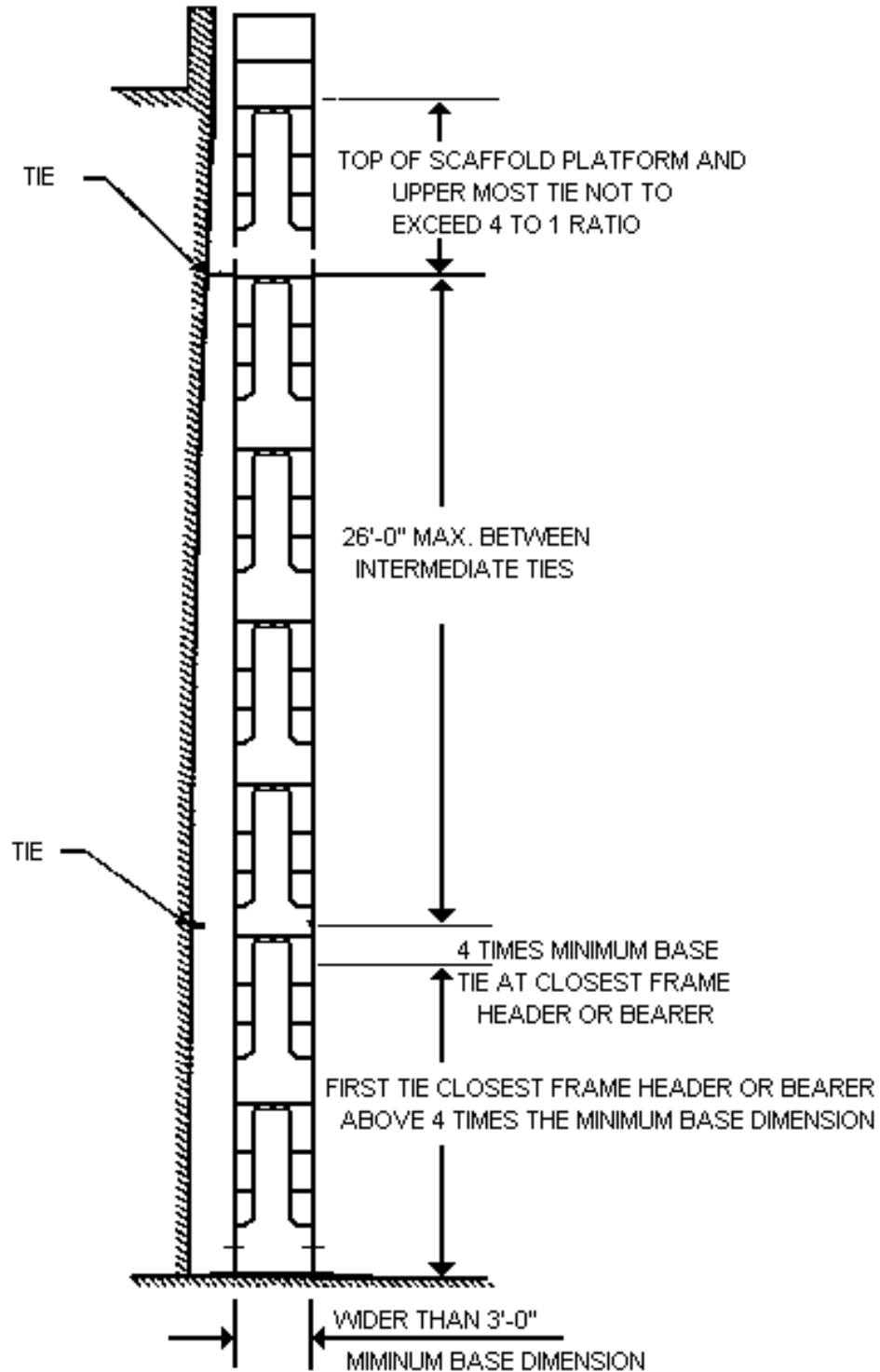




Figure 4.

MAXIMUM VERTICAL TIE SPACING 3'-0" AND NARROWER BASES

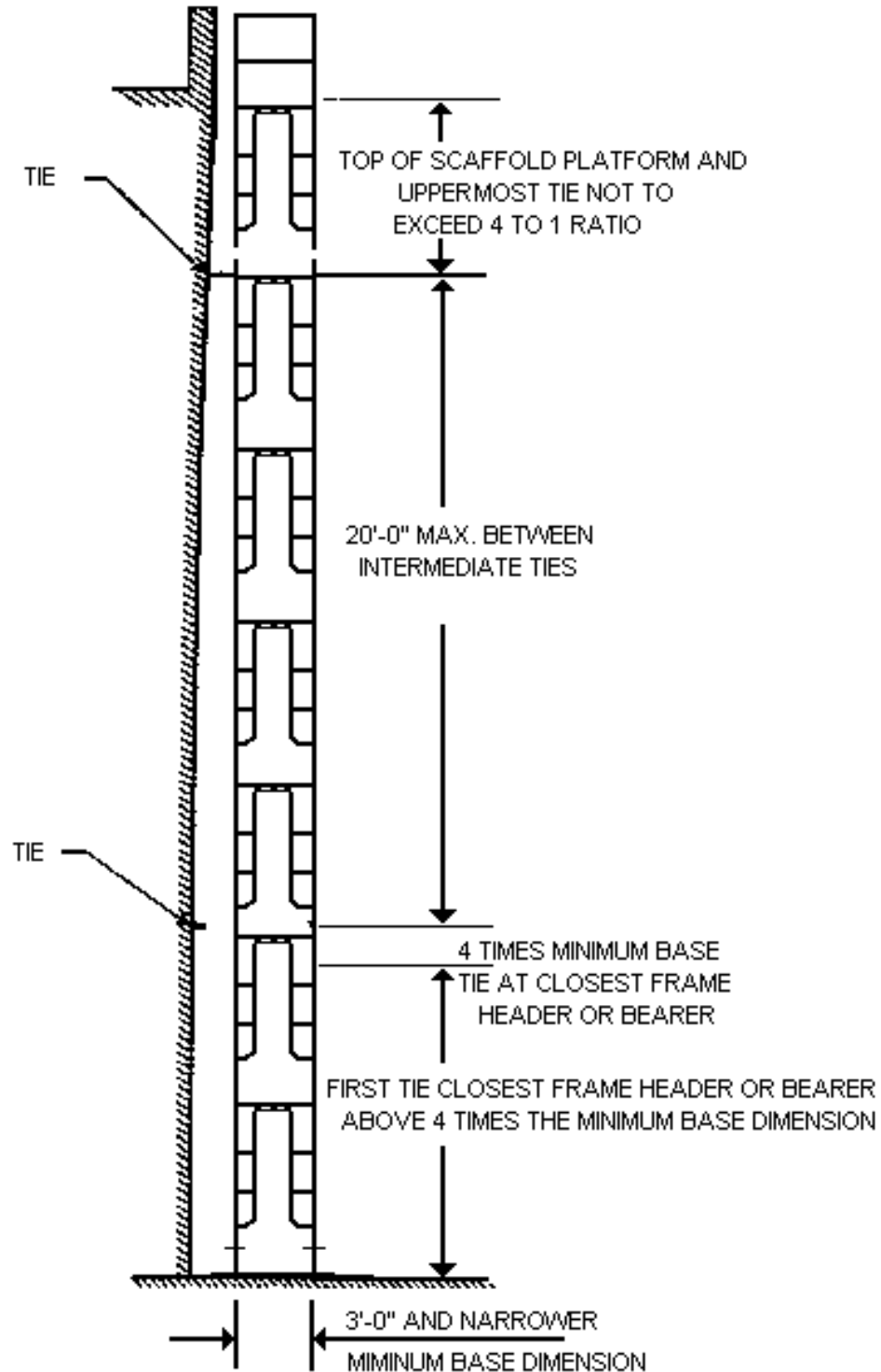
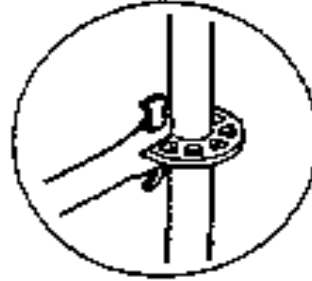
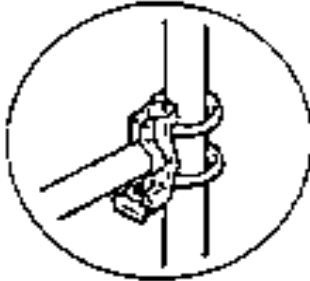




Figure 5.

SYSTEM SCAFFOLD



JOINT CONNECTIONS
VARY ACCORDING
TO MANUFACTURER

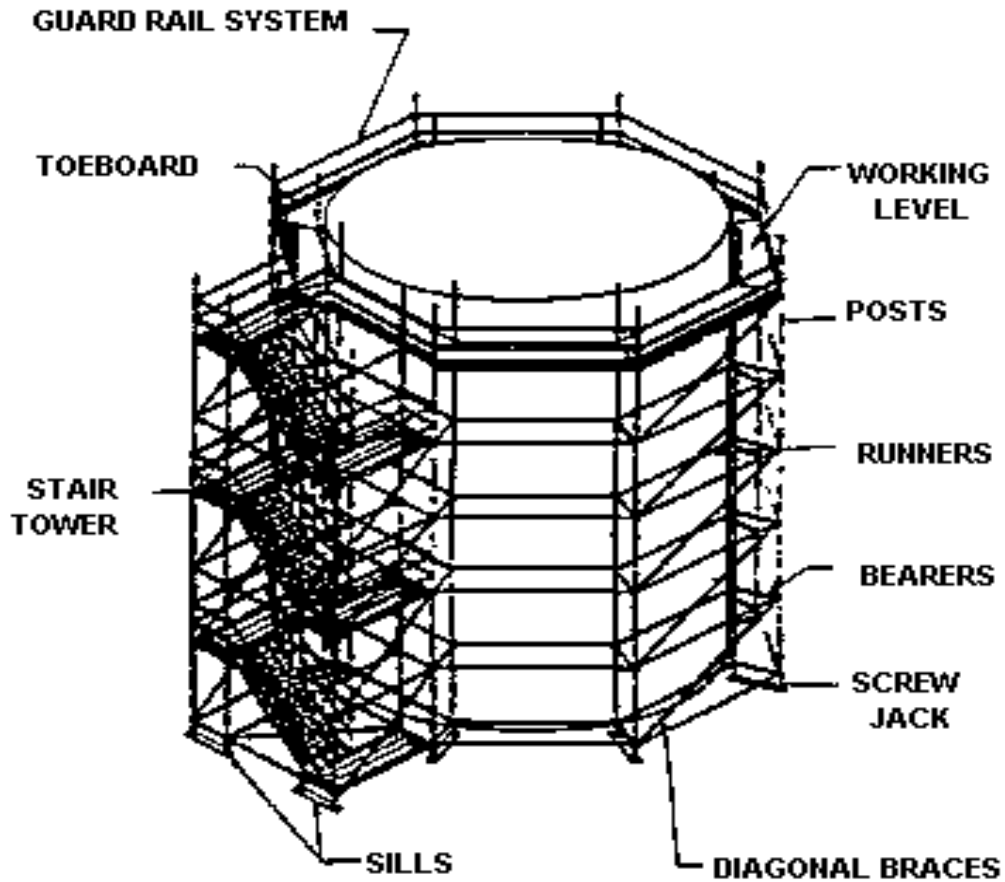
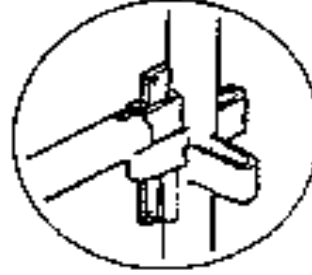
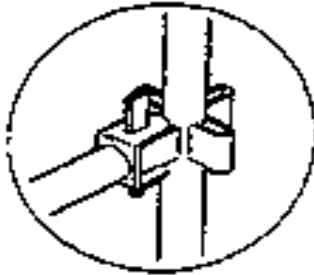




Figure 6.

MILL 10
WC LB[®]
SEL STR
SCAF PLK
D. FIR S. DRY

Grade stamp courtesy of West Coast Lumber Inspection Bureau

SP1B[®] DNS IND 65
KD19 S-DRY (7)
SCAFFOLD PLANK

Grade stamp courtesy of Southern Pine Inspection Bureau



Figure 7.

TUBE and COUPLER SCAFFOLD

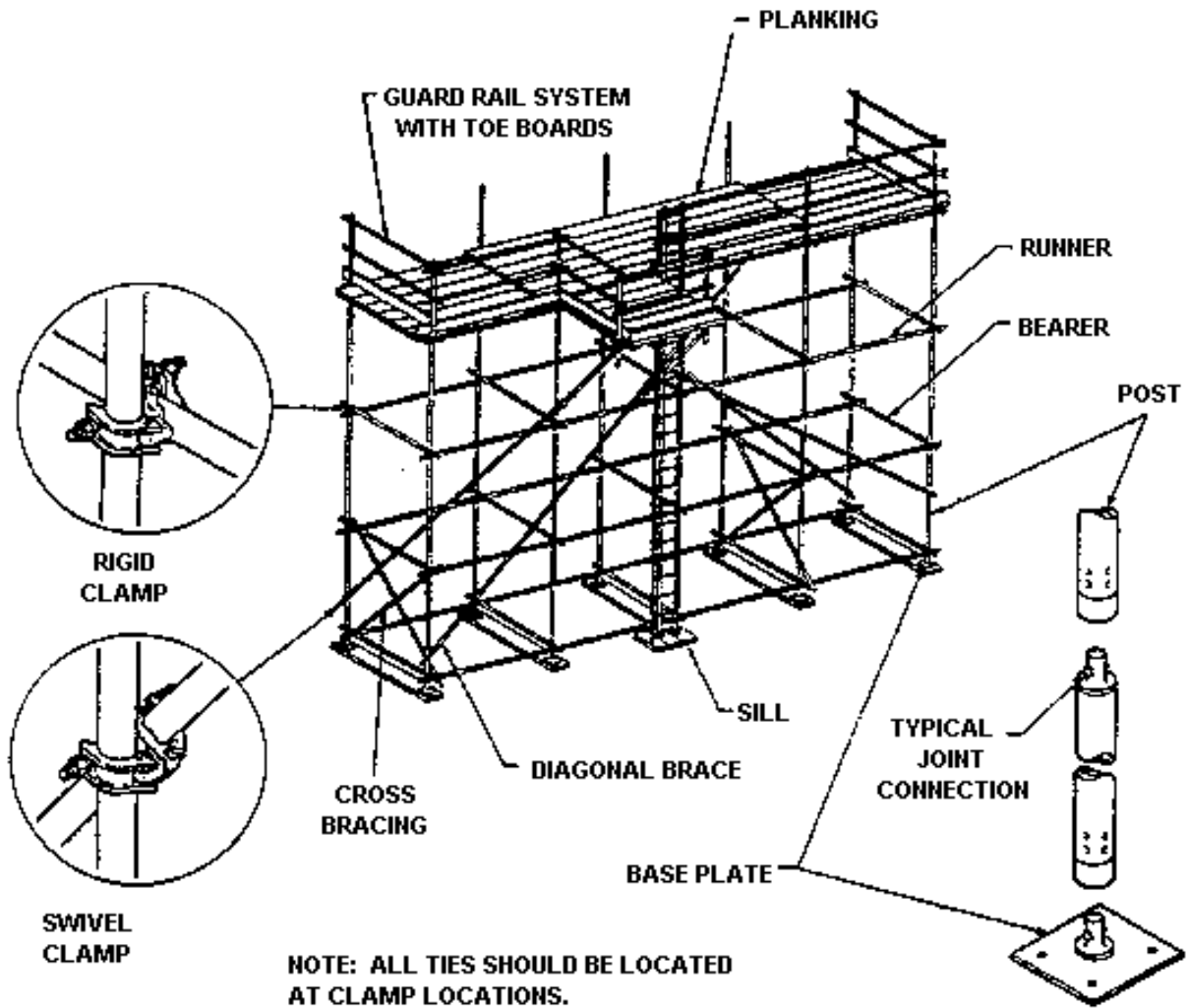
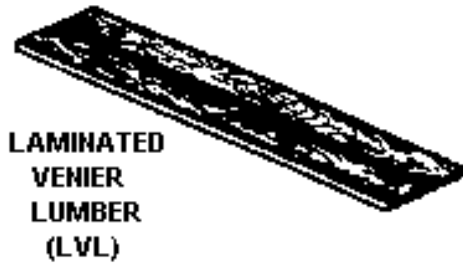




Figure 8.

SCAFFOLDING WORK SURFACES



LAMINATED
VENIER
LUMBER
(LVL)



SOLID
SAWN
LUMBER

SCAFFOLD PLANKS



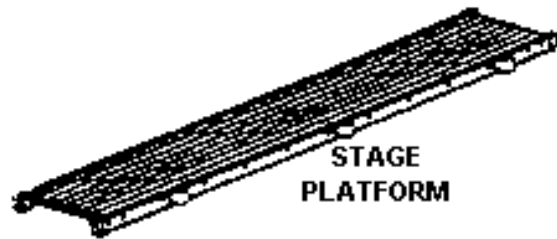
FABRICATED
SCAFFOLD
DECK



FABRICATED
SCAFFOLD
PLANK



DECORATOR PLANK



STAGE
PLATFORM



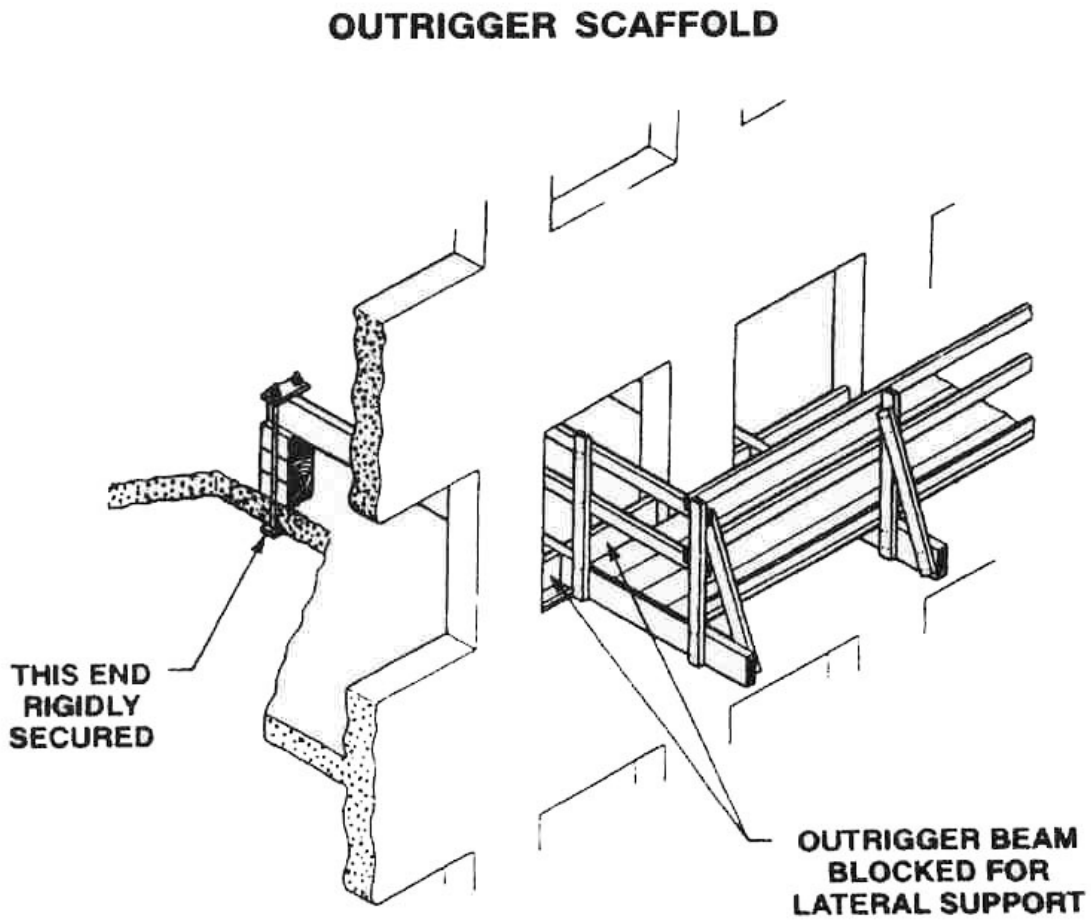
WOOD
SCAFFOLD
PLATFORM



METAL
SCAFFOLD
PLATFORM



Figure 9.



[61 FR 46025, Aug. 30, 1996; 61 FR 59831, Nov. 25, 1996]





NOTES & SCRIBBLES



Can I get a parachute? A hang glider? Maybe a couple bungee cords hooked together?





SCAFFOLD USER GLOSSARY

Adjustable Suspension Scaffold: A suspension scaffold equipped with a hoist(s) that can be operated by an employee(s) on the scaffold.

Angulated Roping: A system of platform suspension in which the upper wire rope sheaves or suspension points are closer to the plane of the building face than the corresponding attachment points on the platform, thus causing the platform to press against the face of the building.

Bearer (putlog): 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.

Boatswain's Chair: 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): A strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

Body Harness: 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: 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: A supported scaffold composed of framed squares which support a platform.

Source: 1926 Safety and Health Regulations for Construction Subpart: L Scaffolds 1926.450 Scope, Application, and Definitions applicable to this Subpart (L). Downloaded 9/11/04 – <http://www.osha.gov/SLTC/etools/scaffolding/glossary.html>.



Carpenters' Bracket Scaffold: A supported scaffold consisting of a platform supported by brackets attached to building or structural walls.

Catenary Scaffold: 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: A multi-point adjustable suspension scaffold used to provide access to work inside chimneys. (See "Multi-point Adjustable Suspension Scaffold".)

Cleat: 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: 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): 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: A device for locking together the tubes of a tube and coupler scaffold.

Crawling Board (Chicken Ladder): A supported scaffold consisting of a plank with cleats spaced and secured to provide footing, for use on sloped surfaces such as roofs.

Deceleration Device: 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: 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: 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: 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: A loop with or without a thimble at the end of a wire rope.

Fabricated Decking and Planking: Manufactured platforms made of wood (including laminated wood and solid sawn wood planks), metal, or other materials.

Fabricated Frame Scaffold (Tubular Welded Frame Scaffold): A scaffold consisting of a platform(s) supported on fabricated end frames with integral posts, horizontal bearers, and intermediate members.

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

Float (Ship) Scaffold: 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: A supported scaffold consisting of a platform supported by brackets attached to formwork.

Guardrail System: A vertical barrier, consisting of, but not limited to, toprails, midrails, and posts, erected to prevent employees from falling off a scaffold platform or walkway to lower levels.

Hoist: A manual or power-operated mechanical device to raise or lower a suspended scaffold.

Horse Scaffold: 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: A suspension scaffold consisting of a platform suspended from the ceiling or roof structure by fixed length supports.

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

Ladder Stand: A mobile, fixed-sized, self-supporting ladder consisting of a wide flat tread ladder in the form of stairs.

Landing: A platform at the end of a flight of stairs.

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



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

Lifeline: 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.

Longitudinal Bracing: Bracing parallel to the long side of the scaffold, so the X runs the same direction as the long side of the scaffold.

Lower Levels: 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: A continuous-run suspension scaffold designed and used for masonry operations.

Maximum Intended Load: 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: A powered or unpowered, portable, caster, or wheel-mounted supported scaffold.

Multi-level Suspended Scaffold: 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: A suspension scaffold consisting of a platform(s) suspended by more than two ropes from overhead supports and equipped with a means to raise and lower the platform to desired work levels. Such scaffolds include chimney hoists.

Needle Beam Scaffold: A platform suspended from needle beams.

Open Sides and Ends: The edges of a platform that are more than 14 inches (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: 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): 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: 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: 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: 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: 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: A hoist powered by other than human energy.

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

Qualified: One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems related to the subject matter, work, or project.

Rated Load: The manufacturer's specified maximum load to be lifted by a hoist or applied to a scaffold or scaffold component.

Repair Bracket Scaffold: 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: A rooftop supported scaffold consisting of a platform resting on angular-shaped supports.

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



Scaffold: 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: 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: A supported scaffold placed against a building or structure and held in place with props.

Single-point Adjustable Suspension Scaffold: A suspension scaffold consisting of a platform suspended by one rope from an overhead support and equipped with means to permit the movement of the platform to desired work levels.

Single-pole Scaffold: 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): 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: The load at which the prime-mover of a power-operated hoist stalls or the power to the prime-mover is automatically disconnected.

Static Lines: Separate ropes secured at their top and bottom ends closer to the plane of the building face than the outermost edge of the platform. By drawing the static line taut, the platform is drawn against the face of the building.

Step, Platform, and Trestle Ladder Scaffold: A platform resting directly on the rungs of step ladders or trestle ladders.

Stilts: 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: A continuous-run suspension scaffold designed and used for stonesetters' operations.

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

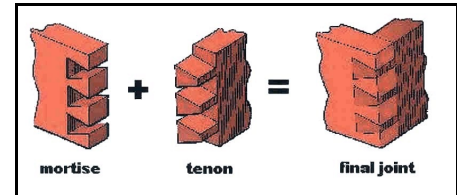
Suspension Scaffold: One or more platforms suspended by ropes or other non-rigid means from an overhead structure(s).



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

Tank Builders' Scaffold: 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.

Tenon: A projecting member in a piece of wood or other material for insertion into a mortise to make a joint.



Top Plate Bracket Scaffold: 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.

Transverse Bracing: Bracing at right angles to the long side of the scaffold, so the X is in the interior scaffold space, between parallel uprights.

Tube and Coupler Scaffold: 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): 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: 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: A rope used to support the horizontal rope in catenary scaffolds.

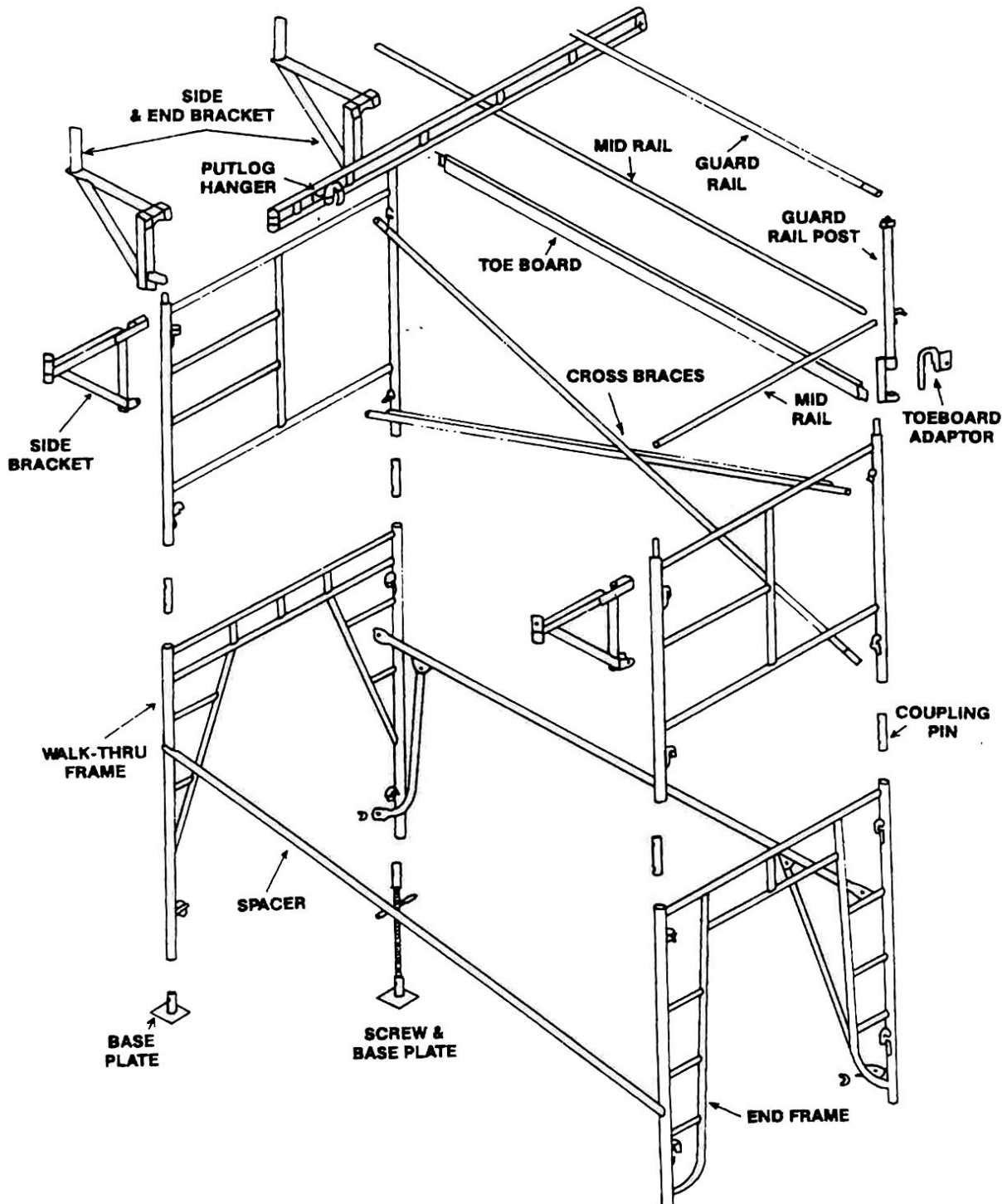
Walkway: A portion of a scaffold platform used only for access and not as a work level.

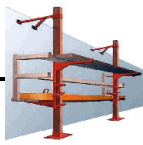
Window Jack Scaffold: A platform resting on a bracket or jack which projects through a window opening.





FABRICATED FRAME SCAFFOLD





SCAFFOLD USER INDEX TO SUBPART L

Source:

“Index” from *A Guide to Scaffold Use in the Construction Industry*. U.S. Department of Labor. OSHA Publication 3150, revised. Small Business Safety Management Series. 173 pp. 2002. Downloaded as a PDF file 9/13/04 from <http://www.osha.gov/pls/publications/pubindex.list>.

Access	1926.451(e)	Carpenters’ Bracket Scaffolds	1926.452(g)
Adjustable Scaffolds		Catenary Scaffolds	1926.452(r)
Supported: See Self-contained Adjustable		Coatings	1926.451(b)(9)
Suspended: See Suspension Scaffolds		Competent Person	
Aerial Lifts	1926.453	Erectors and Dismantlers	1926.452(g)
Aerial Lift, Controls	1926.453(b)(2)	and 454(b)	
Aerial Lift, Electrical Testing	1926.453(b)(3)	General	1926.451(f)(7)
Aerial Lift, Hydraulic Lines ..	1926.453(b)(4)	Inspections	1926.451(d)(10)
Aerial Lift, Welding	1926.453(b)(5)	and (f)(3) and (g)(4)(xvi)	
ANSI Standards, Aerial Lifts	Appendix C	Suspension Scaffolds	1926.451(d)(3)(I)
Banding, Steel or Plastic .	1926.451(g)(4)(xiii)	and (d)(18)	
Barricades	1926.451(h)(2)(I)	Training	1926.454(b)
Base Plates	1926.451(c)(2)	Components	1926.451(b)(10)
Boatswains’ Chairs	1926.452(o)(3)-(7)	and (b)(11)	
Braking Device	1926.451(d)(16)	Corrosives	1926.451(f)(11)
Bricklayers’ Square Scaffolds	1926.452(e)	Counterweights	1926.451(d)(ii)-(iv)
Bricklaying	1926.451(g)(1)(iv)	Crawling Boards	1926.452(m)
Canopies	1926.451(h)(2)(v)&(3)	(Chicken Ladders)	
Capacity, Rope	1926.451(a)(3)	Crossbracing	1926.451(e)(9)(iv)
Capacity, Scaffold	1926.452(a)(1)&(d)(1)	and (g)(4)(xv)	

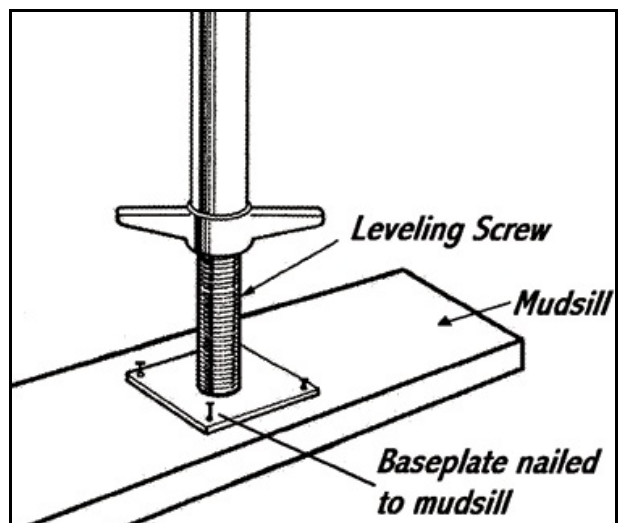


Debris	1926.451(f)(13)	Ladders, Built-in	1926.451(e)(6)
Decks	1926.451(b)(1)	Ladder Jack Scaffolds	1926.452(k) and Appendix A(k)
Decorators' Scaffolds	1926.452(d)	Large Area Scaffolds	1926.452(d)
Deflection	1926.451(f)(16)	Lifeline	1926.4541(g)(3)-(iv)
Different Components	1926.451(b)(10) and (11)	Load	1926.450(b) and .451(a)
Dismantlers	1926.451(e)(9) and (g)(2) and Appendix D	Load Carrying Members	1926.451(a)(1) and Appendix A(1)(a)
Engineer	1926.451(d)(3)(I) and (f)(5) 1926.452(a)(10) and (b)(10) and (c)(5) and (c)(6)	Mason's Multi-point	1926.452(q) Suspension Scaffolds
Erectors	1926.451(e)(9) and (g)(2) and Appendix D	Midrails	1926.451(g)(4)(ix) and (xiv)
Extend Over Ends	1926.451(b)(5)	Mobile Scaffolds	1926.452(w) and Appendix (A) (2)(z)
Fabricated Frame Scaffolds	1926.452(c)	Moving	1926.451(f)(7)
Fall Arrest Systems	1926.451(g)(1) and (3)	Mud Sills	1926.451(c)(2)
Fall Protection	1926.451(g)	Multi-level Suspended	1926.452(v) Scaffolds
False Car (elevator)	1926.450(b) and .451(a)-(b) and (d)-(h) and .454, (Ref: FR Vol. 61, No. 170, 8/30/96, p. 46028)	Multi-point Adjustable	1926.452(q) Suspension Scaffolds
Float (ship) Scaffolds	1926.452 (safety and health programs)	Needle Beam Scaffolds	1926.452(u)
Footing	1926.451(c)(2)	Outrigger Beams	1926.451(d)(3)(vi), (viii), and (4)(v)
Form Scaffolds	1926.452(g)	Outrigger Scaffolds	1926.452(I)
Front Edge	1926.451(b)(3)	Overlap	1926.451(b)(7)
Grab Lines	1926.451(g)(1)(iii)	Planking	1926.451(b) and Appendix A (1)(b) and (c)
Guardrails	1926.451(g)(4) and (h)(2)(iv)	Plasterers' Scaffolds	1926.452(d)
Guys	1926.451(c)(1)	Platforms	1926.451(b) and (c)(2)(iv) and (d)(19) and (f)(14)
Horizontal, Lifelines	1926.451(g)(3)(ii), (iii), (iv)	Platform Scaffolds	1926.452(n)
Horizontal, Lifelines on ..	1926.451(g)(3)(iii), One or Two-point Scaffolds (iv)	Pole Scaffolds	1926.452(a)
Horse Scaffolds	1926.452(f)	Power Lines	1926.451(f)(6)
Inspections	1926.451(d)(10) and (f)(3) and (g)(4)(xiv)	Pump Jack Scaffolds	1926.452(j) and Appendix A(j)
Interior Hung Scaffolds	1926.452(t) and Appendix A (2)(t)	Qualified Person	
Ladders	1926.452(e)(2) and (f)(15)	Component Construction	1926.451(a)(6)
		Design	1926.451(a)(6)
		Loading	1926.451(a)(6)
		Single-point Adjustable	1926.452(0)(2)(I) Suspension, Rigging
		Swaged	1926.451(d)(11)



Two-point Adjustable 1926.452(p)(1)
 Suspension, Platforms
 Training 1926.454(a)
 Ramps 1926.452(j)-(iii)
 Repair 1926.451(f)(4)
 Repair Bracket Scaffolds 1926.452(x)
 Replacement 1926.451(f)(4)
 Ropes
 Drum Hoist 1926.451(d)(6)
 Inspection 1926.451(d)(10)
 Joined 1926.451(d)(8)
 Repaired 1926.451(d)(7)
 Suspension 1926.451(a)(3) and
 (4) and (f)(10)
 Thimbles 1926.451(d)(9)
 Tiebacks 1926.451(d)(5)(iv)
 Spliced Eye 1926.451(d)(11)
 Swag 1926.451(d)(11)
 Roof Bracket Scaffolds 1926.452(h)
 Roof Hooks, Irons 1926.451(d)(5)
 Roof Truss 1926.452(g) & .450(b)
 Self-contained 1926.450(a), FR Vol.
 Adjustable Scaffold 61, No. 170, 8/30/96,
 p. 46057
 Single-point adjustable 1926.451(a),(d),
 Suspension Scaffolds (f),(g)(1)(i),(ii),(iv),
 (g)(3),(4),(h), and .452(o)
 Slip Resistant Finishes 1926.451(b)(9)
 Stall Load 1926.450(b), .451(a)(2),
 and (a)(4) and (a)(5)
 Step Ladder Scaffolds 1926.452(n)
 Stilts 1926.452(y)
 Stonesettors' Multi-point 1926.452(q)
 Suspension Scaffolds
 Supported Scaffolds 1926.450(b), and
 .451(a),(c),(e),(f),(g),(h), and .454
 Suspension Scaffolds 1926.451(a),(d),
 (e),(f),(g)(1)(i),(ii),(iv),(g)(3),(4),(h),
 and .452(0)-(q),(s),(t),(v),(x)
 Tag Lines 1926.451(f)(9)
 Tiebacks 1926.451(d)(3)(vii),
 (ix),(x), and (5)(iii),(iv)
 Tie-ins 1926.451(c)(1) and (d)(18)

Tipping 1926.451(c)(1)
 Toeboards 1926.451(h)(1),
 (2)(ii),(iii)&(4)
 Tower Trucks 1926.453(b)(1)
 Training 1926.454
 Trestle Ladder Scaffolds 1926.452(n)
 Tube and Coupler Scaffolds 1926.452(b)
 Two-point Adjustable 1926.451(a),(d),(e)
 Suspension Scaffolds (f),(g)(1)(i),(ii),(iv),
 (g)(3),(4),(h), and .452(p) & .454
 Vertical Lifelines 1926.451(g)(3)(i),(iv)
 Walkways 1926.451(e)(5)(i)-(iii)
 Weather 1926.451(f)(8) and (12)
 Welding from 1926.451(f)(17)
 Suspension Scaffolds
 Wire Rope Clips 1926.451(d)(12)
 Window Jack Scaffolds 1926.452(l)





NOTES & SCRIBBLES

