



DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS

DIRECTOR'S OFFICE

CONSTRUCTION SAFETY AND HEALTH STANDARD

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(as amended October 20, 1997) (as amended April 28, 1999) (as amended April 4, 2013)
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These rules become effective immediately upon filing with the secretary of state unless adopted under section 33, 44, or 45a(6) of the administrative procedures act of 1969, 1969 PA 306, MCL 24.233, 24.244, or 24.245a.

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(By authority conferred on the director of the department of licensing and regulatory affairs by sections 14, 16, 19, 21, and 24 of the Michigan occupational safety and health act, 1974 PA 154, MCL 408.1014, 408.1016, 408.1019, 408.1021, and 408.1024, and Executive Reorganization Order Nos. 1996-1, 1996-2, 2003-1, 2008-4, and 2011-4, MCL 330.3101, 445.2001, 445.2011, 445.2025, and 445.2030)

R 408.41201, R 408.41210, R 408.41211, R 408.41212, R 408.41213, R 408.41217, R 408.41233, R 408.41234, R 408.41241, R 408.41243, R 408.41256, and R 408.41256a of the Michigan Administrative Code are amended, and R 408.41202, R 408.41203, R 408.41204, R 408.41205, R 408.41206, R 408.41207, R 408.41208, R 408.41209, R 408.41215, R 408.41219, R 408.41224, R 408.41225, R 408.41226, R 408.41229, R 408.41239, R 408.41240, R 408.41256b, and Appendix A, are rescinded, as follows:

**CONSTRUCTION SAFETY AND HEALTH STANDARD
PART 12. SCAFFOLDS AND SCAFFOLD PLATFORMS**

Table of Contents:

R 408.41201 Scope, adoption, and availability of standards.....	2	R 408.41234 Multilevel suspension scaffolds.....	12
R 408.41210 Construction and capacity generally.....	3	R 408.41235 Single-point adjustable suspension scaffolds.....	12
R 408.41211 Access to scaffold platforms.....	4	R 408.41236 Needle beam scaffolds.....	12
R 408.41212 Accumulation of tools, material, or debris prohibited; weather conditions; slippery conditions; electrical hazards; rope protection; fall protection.	5	R 408.41237 Boatswain's chair.....	12
R 408.41213 Guardrails; fall arrest devices.....	6	R 408.41238 Float scaffolds.....	12
R 408.41214 Hoisting machines generally.....	7	MOBILE SCAFFOLDS	12
R 408.41216 Manually powered hoisting machines....	7	R 408.41241 Mobile scaffolds.....	12
R 408.41217 Planking and scaffold platforms generally.....	8	R 408.41243 Rough terrain forklift truck scaffolds; equipment requirements; employee safety requirements.....	13
R 408.41218 Plywood scaffold platforms.....	8	R 408.41245 Operator training.....	14
FLOOR AND GROUND SUPPORTED SCAFFOLDS	9	AUXILIARY SUPPORTED SCAFFOLDS	14
R 408.41221 Stilts.....	9	R 408.41251 Outrigger scaffolds.....	14
R 408.41222 Wood pole scaffolds.....	9	R 408.41253 Roofing brackets and crawling boards.	15
R 408.41223 Tube and coupler scaffolds.....	9	R 408.41254 Carpenter's bracket scaffold.....	15
R 408.41227 Pump jack scaffolds.....	11	R 408.41255 Form Scaffolds.....	15
SUSPENDED SCAFFOLDS	11	R 408.41256 Ladder jack scaffolds.....	15
R 408.41231 Adjustable multipoint suspension scaffolds.....	11	R 408.41256a Step, platform, and trestle ladder scaffolds.....	15
R 408.41232 Multipoint suspended scaffold.....	11	WIRE, FIBER AND SYNTHETIC ROPE	16
R 408.41233 Two-point adjustable suspension scaffolds; swing stage scaffold.....	11	R 408.41261 Wire rope.....	16
		R 408.41264 Window jack scaffolds.....	16

1926.450 - SCOPE, APPLICATION AND DEFINITIONS APPLICABLE TO THIS SUBPART	17
1926.450(a) Scope and application.....	17
1926.450(b) Definitions.	17
1926.451 - GENERAL REQUIREMENTS	20
1926.451(a) Capacity	20
1926.451(b) Scaffold platform construction.	20
1926.451(c) Criteria for supported scaffolds.	21
1926.451(d) Criteria for suspension scaffolds.....	22
1926.451(e) Access.....	24
1926.451(f) Use.....	25
1926.451(g) Fall protection.	27
1926.451(h) Falling object protection.	29
1926.452 - ADDITIONAL REQUIREMENTS APPLICABLE TO SPECIFIC TYPES OF SCAFFOLDS	30
1926.452(a) Pole scaffolds.....	30
1926.452(b) Tube and coupler scaffolds.....	30
1926.452(c) Fabricated frame scaffolds (tubular welded frame scaffolds).....	31
1926.452(d) Plasterers', decorators', and large area scaffolds.....	31
1926.452(e) Bricklayers' square scaffolds (squares).....	31
1926.452(f) Horse scaffolds.	32
1926.452(g) Form scaffolds and carpenters' bracket scaffolds.	32
1926.452(h) Roof bracket scaffolds.	32

1926.452(i) Outrigger scaffolds.	32
1926.452(j) Pump jack scaffolds.....	33
1926.452(k) Ladder jack scaffolds.....	33
1926.452(l) Window jack scaffolds.	33
1926.452(m) Crawling boards (chicken ladders).33	
1926.452(n) Step, platform, and trestle ladder scaffolds.	34
1926.452(o) Single-point adjustable suspension scaffolds.	34
1926.452(p) Two-point adjustable suspension scaffolds (swing stages).	34
1926.452(q) Multi-point adjustable suspension scaffolds, stonemasons' multi-point adjustable suspension scaffolds, and masons' multi-point adjustable suspension scaffolds.	35
1926.452(r) Catenary scaffolds.	35
1926.452(s) Float (ship) scaffolds.	35
1926.452(t) Interior hung scaffolds.	35
1926.452(u) Needle beam scaffolds.....	36
1926.452(v) Multi-level suspended scaffolds.....	36
1926.452(w) Mobile scaffolds.	36
1926.452(x) Repair bracket scaffolds.	37
1926.452(y) Stilts.	37
1926.454 - TRAINING REQUIREMENTS	38
Appendix A - Scaffold Specifications.....	39
Appendix D - List Of Training Topics For Scaffold Erectors And Dismantlers	51
Appendix E - Drawings And Illustrations	52

R 408.41201 Scope, adoption, and availability of standards.

Rule 1201. (1) These rules apply to scaffolds and scaffold platforms used in construction operations. The equipment may be commercially manufactured or job-built.

(2) These rules do not apply to crane or derrick suspended personnel platforms as prescribed in Construction Safety and Health Standard Part 10. "Cranes and Derricks" and Construction Safety Standard Part 32. "Aerial Work Platforms."

(3) The following federal Occupational Safety and Health Administration (OSHA) regulations are adopted by reference in these rules:

(a) 29 CFR 1926.450 "Scope, application and definitions applicable to this subpart," as amended August 9, 2010.

(b) 29 CFR 1926.451 "General requirements," as amended November 25, 1996, except 29 CFR 1926.451(c)(2) to (iii) is replaced with R 408.41210(2) in these rules.

(c) 29 CFR 1926.452 "Additional requirements applicable to specific types of scaffolds," as amended August 30, 1996.

(d) 29 CFR 1926.454 "Training requirements," as amended August 30, 1996.

(e) 29 CFR part 1926, subpart L, appendix A "Scaffold Specifications," as amended August 7, 2012.

(f) 29 CFR part 1926, subpart L, appendix D "List of Training Topics for Scaffold Erectors and Dismantlers," as amended August 30, 1996.

(g) 29 CFR part 1926, subpart L, appendix E "Drawings and Illustrations," as amended November 25, 1996.

(4) A reference to 29 CFR 1926.21 means Construction Safety Standard Part 1. "General Rules."

(5) A reference to 29 CFR 1926.453 means Construction Safety Standard Part 32. "Aerial Work Platforms."

(6) A reference to 29 CFR 1926.502 means Construction Safety Standard Part 45. "Fall Protection."

(7) The adopted federal regulations have the same force and effect as a rule promulgated under the Michigan occupational safety and health act, 1974 PA 154, MCL 408.1001 to 408.1094.

(8) The OSHA regulations adopted in these rules are available from the United States Department of Labor, Occupational Safety and Health Administration website, www.osha.gov, at no charge, as of the time of adoption of these rules.

(9) The American National Standards Institute Standard ANSI A10.8 "Scaffolding Safety Requirements," 1977 edition, is adopted in these rules. This standard is available from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado, 80112, USA, telephone number: 1-800-854-7179 or via the internet at the company's website, <http://global.ihs.com>, at a cost as of the time of adoption of these rules of \$25.00.

(10) The standards adopted in these rules are available for inspection at the Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143.

(11) The standards adopted in these rules may be obtained from the publisher or the Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143, at the cost charged in this rule, plus \$20.00 for shipping and handling.

(12) The following Michigan Occupational Safety and Health Administration (MIOSHA) standards are referenced in these rules. Up to 5 copies of these standards may be obtained at no charge from the Michigan Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143 or via the internet at the following website: www.michigan.gov/mioshastandards. For quantities greater than 5, the cost, as of the time of adoption of these rules, is 4 cents per page.

(a) Construction Safety Standard Part 1. "General Rules," R 408.40101 to R 408.40134.

(b) Construction Safety and Health Standard Part 6. "Personal Protective Equipment," R 408.40601 to R 408.40660.

(c) Construction Safety and Health Standard Part 10. "Cranes and Derricks," R 408.41001 to R 408.41099a.

(d) Construction Safety Standard Part 11. "Fixed and Portable Ladders," R 408.41101 to R 408.41140.

(e) Construction Safety Standard Part 16. "Power Transmission and Distribution," R 408.41601 to R 408.41658.

(f) Construction Safety Standard Part 17. "Electrical Installations," R 408.41701 to R 408.41734.

(g) Construction Safety Standard Part 21. "Guarding of Walking and Working Areas," R 408.42101 to R 408.42160.

(h) Construction Safety and Health Standard Part 30. "Telecommunications for Construction," R 408.43001 to R 408.43006.

(i) Construction Safety Standard Part 32. "Aerial Work Platforms," R 408.43201 to R 408.43220.

(j) Construction Safety Standard Part 45. "Fall Protection," R 408.44501 to R 408.44502.

R 408.41202 Rescinded.

R 408.41203 Rescinded.

R 408.41204 Rescinded.

R 408.41205 Rescinded.

R 408.41206 Rescinded.

R 408.41207 Rescinded.

R 408.41208 Rescinded.

R 408.41209 Rescinded.

R 408.41210 Construction and capacity generally.

Rule 1210. (1) A scaffold shall be designed, constructed, erected, and used pursuant to the provisions of these rules, 29 CFR 1926.451 and 29 CFR 1926.452, as adopted by reference in R 408.41201. A scaffold shall be designed by a qualified person.

(2) The support for a scaffold shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Leveling jack adjusting screws, when used, shall not extend more than 18 inches below the base of the scaffold. Unstable objects, such as barrels, boxes, pallets, brick, or concrete blocks, shall not be used to support a scaffold or work platform. Scaffold poles, legs, posts, frames, and uprights shall bear on base plates, along with mudsills or other adequate support.

R 408.41211 Access to scaffold platforms.

Rule 1211. (1) Access to a scaffold platform shall be provided by 1 or more of the following:

(a) A ladder that conforms to Construction Safety Standard Part 11. "Fixed and Portable Ladders," as referenced in R 408.41201.

(b) Hook-on or attachable metal ladders that are specifically designed for use in construction with manufactured types of scaffolds. If hook-on or attachable metal ladders are used as access to, or egress from, a work platform that is more than 35 feet above the ground or floor level, then a ladder safety device shall be installed or the ladders shall be offset with landing platforms and guardrails that are installed at not more than 35-foot intervals.

(c) Step or hook-on, stair-type accessories that are specifically designed for use with appropriate types of scaffolds.

(d) Direct access from an adjacent scaffold, the structure, or personnel hoist. The 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.

(e) A ramp, runway, or stairway that conforms to Construction Safety Standard Part 21. "Guarding of Walking and Working Areas," as referenced in R 408.41201.

(2) The intermediate horizontal members of the frame of a manufactured tubular welded frame scaffold may be used instead of a ladder or stairway for access to, and egress from, the work platform, if all of the following conditions are met:

(a) All the frames and component parts are compatible in design.

(b) The intermediate horizontal members of a frame are a minimum of 11 1/2 inches in length.

(c) The horizontal members of each frame shall be uniformly spaced and shall not be more than 18 inches center to center vertically.

(d) When frames are connected vertically to one another, the distance between the bottom horizontal member of the upper end frame and the top horizontal member of the lower end frame shall be within 3 inches of the uniform spacing of the horizontal members of each frame.

(e) The elevation to the lowest horizontal member of the bottom frame shall not be more than 24 inches from the ground or floor.

(f) Each horizontal member shall be capable of supporting 300 pounds applied at its midpoint without bending or cracking.

(g) Each horizontal member shall be inspected for, and found free of, cracks, bends, or bad welds. Cracks, bends, or bad welds shall be corrected.

(h) Only 1 employee at a time shall use a horizontal member of a frame as access to, or egress from, the workstation.

(i) Cross braces shall not be used as a means of access.

(3) The guardrail system located on the side where horizontal members of the scaffold frame are used for access to, or egress from, a work platform shall be constructed as follows:

(a) The intermediate rail shall be omitted between the corner posts at the access location.

(b) The top rail shall be continuous between posts. A scaffold and its components shall be capable of supporting, without failure, not less than 4 times the maximum intended load.

(4) If horizontal members of scaffold frames are used as access to, or egress from, a work platform which is more than 35 feet above ground or floor level, a ladder safety device shall be installed and used or the horizontal members shall be offset with landing platforms and guardrails that are installed at not more than 30-foot intervals.

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

(6) All of the following provisions apply to erecting or dismantling a scaffold:

(a) An employer shall provide a safe means of access for each employee erecting or dismantling a scaffold if providing 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. The determination shall be based on site conditions and the type of scaffold being erected or dismantled.

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

(c) When erecting or dismantling tubular welded frame scaffolds, endframes, that have horizontal members which are parallel, level, and not more than 22 inches apart vertically as climbing devices for access, the employer shall ensure that the tubular welded frame scaffolds are erected in a manner that creates a usable ladder and provides a good handhold and foot space.

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

R 408.41212 Accumulation of tools, material, or debris prohibited; weather conditions; slippery conditions; electrical hazards; rope protection; fall protection.

Rule 1212. (1) Excess tools, materials, and debris shall not be permitted to accumulate on a scaffold to create a hazard.

(2) 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 a scaffold and that the employees are protected by a personal fall arrest system. Wind screens shall not be used unless the scaffold is secured against the anticipated wind forces imposed.

(3) A scaffold shall be kept free of slippery conditions such as those caused by ice, snow, oil, grease, or other slippery compounds.

(4) An employee shall not be allowed within 10 feet of uninsulated electrical energized lines.

(5) Before a scaffold is erected within 10 feet of a power line all of the following requirements shall be met, as applicable:

(a) The utility or property owner is consulted.

(b) A power line or electrical apparatus is considered energized unless the property owner or utility indicates it is de-energized and the line or apparatus is visibly grounded. If de-energizing is impractical and the equipment is exposed to contact by an employee, the minimum clearances in table 1 shall be maintained between the scaffold, employee, or material, whichever is closer.

(c) The requirements for employees performing power transmission and distribution work, electrical work, or telecommunications work are found in Construction Safety Standard Part 16. "Power Transmission and Distribution," Construction Safety Standard Part 17. "Electrical Installations," and in Construction Safety and Health Standard Part 30. "Telecommunications for Constructions," as referenced in R 408.41201.

(6) Table 1 reads as follows:

TABLE 1		
INSULATED LINES		
VOLTAGE	MINIMUM DISTANCE	ALTERNATIVES
Less than 300 volts	3 feet (0.9 meters)	
300 volts to 50 kilovolts	10 feet (3.1 meters)	
More than 50 kilovolts	10 feet (3.1 meters) plus 0.4 inches (1.0 centimeter) for each kilovolt over 50 kilovolts	2 times the length of the line insulator, but not less than 10 feet (3.1 meters)
UNINSULATED LINES		
VOLTAGE	MINIMUM DISTANCE	ALTERNATIVES
Less than 50 kilovolts	10 feet (3.1 meters)	
More than 50 kilovolts	10 feet (3.1 meters) Plus 0.4 inches (1.0 centimeter) for each kilovolt over 50 kilovolts	2 times the length of the line insulator, but not less than 10 feet (3.1 meters)

(7) Welding, burning, riveting, or open flame work shall not be performed within 10 feet of fiber or synthetic rope that is used to suspend a scaffold, unless the rope is protected from sparks, flame, or hot metal. Only treated or protected fiber or synthetic ropes shall be used for or near any work that involves the use of corrosive substances or chemicals.

(8) A suspension rope, including connecting hardware, used on nonadjustable or adjustable suspension scaffolds shall be capable of supporting, without failure, not less than 6 times the maximum intended load applied or transmitted to the rope.

(9) If personal fall arrest systems are required by these rules for the protection of employees, then the arrest system equipment shall be as prescribed in Construction Safety Standard Part 45. "Fall Protection," as referenced in R 408.41201.

(10) To reduce the possibility of welding current arcing through the suspension wire rope when performing welding from suspended scaffolds, a welder shall take the following precautions, as applicable:

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

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

(c) Each hoist shall be covered with insulated protective covers.

(d) 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 the conductor shall be at least the size of the welding process work lead, and the conductor shall not be in series with the welding process or the workpiece.

(e) If the scaffold grounding lead is disconnected, the welding machine shall be shut off.

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

R 408.41213 Guardrails; fall arrest devices.

Rule 1213. (1) A guardrail shall be installed on any open side or end of a scaffold work platform that is 10 feet (3.1 meters) or more above the floor or ground, except for any of the following:

- (a) A boatswain's chair.
- (b) A catenary scaffold.
- (c) A float scaffold.
- (d) A ladder jack scaffold.
- (e) A needle beam scaffold.

The guardrail shall be as prescribed in Construction Safety Standard Part 21. "Guarding of Walking and Working Areas," as referenced in R 408.41201.

(2) An employee on a boatswain's chair, catenary scaffold, float scaffold, needle beam scaffold, or ladder jack scaffold shall be protected by a personal fall arrest system. An employee on a single-point or 2-point adjustable suspension scaffold shall be protected by both a personal fall arrest system and guardrail system.

(3) A personal fall arrest device as prescribed in Construction Safety Standard Part 45. "Fall Protection," as referenced in R 408.41201, shall be worn and attached to a substantial portion of a scaffold when the work platform of an adjustable suspension scaffold with overhead protection is 10 feet (3.1 meters) or more above the floor, water, or ground. Separate safety lines shall be attached to a substantial portion of the structure above and to the scaffold by an approved fall prevention device to prevent the scaffold from falling more than 12 inches if the scaffold suspension system fails.

(4) A top rail or an intermediate rail may be eliminated if the configuration of the scaffold and the material deck provides equivalent protection to prevent an employee falling from the platform or if a personal fall arrest device is worn.

(5) A cross brace may be used as part of the guardrail system as follows:

(a) If the pivot point occurs from 36 inches to 48 inches above the platform, then a midrail shall be added midway between the platform and the brace pivot point.

(b) If the pivot point occurs from 18 inches above the platform, then a top rail shall be added.

(c) If the pivot point occurs less than 18 inches or more than 48 inches above the platform, then both a top rail and midrail shall be provided.

(6) An employer shall have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. An employer shall provide fall protection for employees erecting or dismantling supported scaffolds where the installation and use of the protection is feasible and does not create a greater hazard.

(7) If vertical lifelines are used, then they shall be fastened to a fixed safe point of anchorage and shall be protected from sharp edges and abrasion. Safe points of anchorage include structural members of buildings, but do not include any of the following:

- (a) Standpipes.
- (b) Vents.
- (c) Other piping systems.
- (d) Electrical conduit.
- (e) Outrigger beams.
- (f) Counterweights.

(8) If horizontal lifelines are used, they shall be secured to 2 or more structural members of the scaffold or may be looped around both suspension and independent support lines equal in number to the number of points supported and equivalent in strength to the strength of the suspension ropes. Independent support lines and suspension ropes shall not be attached to the same points of anchorage.

R 408.41214 Hoisting machines generally.

Rule 1214. (1) A hoisting machine shall carry a label of an approved nationally recognized testing laboratory, such as Underwriters Laboratories or Factory Mutual Engineering Corporation, which states that the machine is approved for use on a suspension scaffold, swinging scaffold, or powered mobile elevating platform.

(2) If wire rope is used to suspend an adjustable scaffold, then the rope shall be in compliance with all of the following requirements:

- (a) Have the fixed end equipped with a proper size thimble and attached to the upper support member.
- (b) Have the running rope securely attached to the hoisting drum and have not less than 4 wraps of the rope remain on the drum at all times.

(c) When other types of hoists are used, either 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.

(3) A hoisting machine shall be inspected daily when in use and shall not be put in service unless it is free of defects which would affect the operation of the machine.

(4) The stall load of any scaffold hoist shall not be more than 3 times its rated load.

R 408.41215 Rescinded.

R 408.41216 Manually powered hoisting machines.

Rule 1216. (1) A manually powered hoisting device shall be equipped with a positive locking device.

(2) A manually powered machine shall be designed to prevent free-spooling of the cable drum.

R 408.41217 Planking and scaffold platforms generally.

Rule 1217. (1) If wood planks are used for a work platform, then the planks shall be scaffold-grade lumber that has a minimum of 1,500 pounds per square inch fiber stress value. The planks shall be not less than 2 inches by 10 inches. The platform shall consist of a minimum of 2 planks laid side by side. Each platform on all working levels of scaffolds shall be fully planked or decked between uprights where practicable. Spaces between the platform and the uprights shall not be more than 9 1/2 inches. The maximum permissible spans for 2- by 10-inch or wider planks are as follows:

Working load (per square foot)	Material full thickness undressed lumber				Material nominal thickness lumber			
	25	50	62	75	25	37	50	62
Permissible span (feet)	10	8	7	6	8	7	6	4

(2) Wood scaffold planks, laminated planks, manufactured work platforms, and picks that are found to be defective shall be removed from service and shall not be used.

(3) A manufactured pick shall be permanently marked or tagged to indicate the maximum working load and shall not be less than 14 inches wide when used in single width, except that a ladder jack scaffold may be used with a minimum 12-inch manufactured pick.

(4) Platform planks shall be laid with their edges together so the platform is tight and does not have spaces through which tools or fragments of materials can fall.

(5) Planking shall comply with all of the following provisions:

(a) Extend over the end bearer not less than 6 inches, but not more than 12 inches.

(b) Be cleated or otherwise fastened to prevent shifting and be uniform in thickness, except where lapped as prescribed in subrule (8) of this rule.

(c) Where 16-foot planks are used as prescribed in subrule (7) of this rule, tie downs are not required unless wind uplift may occur.

(6) Hook-on-type manufactured work platforms may be used if they are secured to the bearer.

(7) Where planks are lapped, each plank shall lap its bearer not less than 6 inches, which will provide a minimum overlap of 12 inches.

(8) Where a scaffold turns a corner, the planks shall be laid to prevent tipping. The planks that meet the corner bearer at an angle shall be laid first and shall extend over the diagonally placed bearer far enough to have a good bearing, but not far enough to tip. The planks that run in the different direction shall be laid so as to extend over the rest on the first layer of planks.

(9) When moving a platform to the next level, an employee shall leave the old platform undisturbed until the new platform supports have been set in place and are ready to receive the platform planks.

(10) A platform shall not deflect more than 1/60 of the span when loaded.

(11) A wood platform shall not be covered with opaque finishes, except that platform edges may be covered or marked for identification. A platform 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.

(12) The front of a platform shall be not more than 14 inches from the face of the work unless a guardrail system is erected along the front edge, or unless a personal fall arrest system is used pursuant to Construction Safety Standard Part 45. "Fall Protection," as referenced in R 408.41201, except that the maximum distance from the face of the work for plastering and lathing operations shall be not more than 18 inches.

R 408.41218. Plywood scaffold platforms.

Rule 1218. (1) If plywood is used as a work platform, the plywood shall be supported by 2- by 10- inch planks. The planks shall support 2 parallel edges of the plywood and shall also be spaced not more than 24 inches center to center.

(2) The plywood work surface shall be secured to the planks.

(3) If the plywood work surface is a load-carrying member, it shall have a minimum thickness of 5/8 inch.

R 408.41219 Rescinded.

FLOOR AND GROUND SUPPORTED SCAFFOLDS

R 408.41221 Stilts.

Rule 1221. (1) A stilt shall be inspected for damage, wear, and corrosion. A defective stilt, including the pins and straps, shall be repaired or replaced before being placed in use.

(2) Stilts shall be used only if all of the following conditions exist:

(a) Floors are level.

(b) All floor holes are securely covered.

(c) When an employee is using stilts, the top edge height of the top rail, or equivalent member, shall be increased an amount equal to the height of the stilts.

(d) The floor is capable of supporting a load on the stilt's base plate without deformation of more than 1/4 of an inch.

(e) The floor is cleared of debris, materials, or liquids that could cause a slipping or tripping hazard.

(3) Stilts shall not be used while going from one level to another.

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

R 408.41222 Wood pole scaffolds.

Rule 1222. (1) Where a pole of a wood pole scaffold is spliced, the ends shall be squared and the upper section shall rest squarely on the lower section. Wood splice plates shall be fastened on not less than 2 adjacent sides, shall be not less than 4 feet in length, shall overlap the abutted ends equally, shall have the same width and same total cross-sectional area of the pole, and shall be capable of preventing displacement of the abutted ends. Splice plates of other materials of equivalent strength may be used.

(2) A bearer shall be set with its greater end dimension vertical and shall be long enough to project over the ledgers not less than 3 inches for proper support.

(3) The inner end of a bearer for a single pole scaffold shall be supported in accordance with 1 of the following:

(a) Rest in a wall of a building with not less than a 40 inch bearing. Notching of the bearer is not permitted.

(b) Rest on a 12- by 2- by 6- inch wood block. The block shall be notched at the center to the width of the bearer and 2 inches deep. The bearer shall be nailed to both the block and the building.

(c) At a wall opening by a plank capable of supporting the loaded bearer and fastened to the building. The bearer shall be braced against displacement.

(4) A ledger shall be long enough to extend over 2 pole spaces. The ledger shall not be spliced between the poles. The ledger shall be reinforced by bearing blocks securely nailed to the side of the pole to form a support for the ledger.

(5) Diagonal bracing shall be provided to prevent the poles of a single pole scaffold from moving in a direction parallel with the wall of the building or from buckling.

(6) Bracing shall be provided between the inner and outer sets of poles in independent pole scaffolds. The free ends of pole scaffolds shall be cross braced.

(7) Full diagonal face bracing, in both directions, shall be erected across both faces of pole scaffold. The braces shall be spliced at the poles.

(8) 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 standard contains examples of criteria that will enable an employer to comply with design and loading requirements for pole scaffolds under 60 feet in height.

R 408.41223 Tube and coupler scaffolds.

Rule 1223. (1) A tube and coupler scaffold shall have all posts, bearers, runners, and bracing of not less than a nominal 2-inch (1.90 inches outside dimension) steel tubing or equivalent.

(2) The material used for couplers shall be of a structural type, such as a drop-forged steel, malleable iron, or structural grade aluminum. Dissimilar metals shall not be used.

(3) The posts of a tube and coupler scaffold shall not be spaced more than 6 feet apart in width and not more than 10 feet along the length for a light-duty rated scaffold, 8 feet along the length for a medium-duty rated scaffold, and 6 feet along the length for a heavy-duty rated scaffold.

(4) Drawings and specifications for a tube and coupler scaffold over 125 feet in height above the base plate shall be designed by a qualified engineer who is knowledgeable in scaffolding. Drawings and specifications shall be readily available at the jobsite. A scaffold that is less than 125 feet in height shall conform to the requirements of table 3.

(5) Runners shall be erected along the length of the scaffold and located on both the inside and the outside posts at even heights. When tube and coupler guardrails and midrails are used on outside posts, they may be used in place of outside runners. Runners shall be interlocked to form a continuous length and coupled to each post. The bottom runner shall be located as close to the base as possible. The runners shall be placed not more than 6 feet 6 inches on centers.

(6) A bearer shall be installed transversely between posts and shall be securely coupled either to a post bearing on a runner coupler or directly to a runner and shall be kept as close to the post as possible.

(7) A bearer shall be not less than 4 inches, but not more than 12 inches, longer than the post spacing or runner spacing. A bearer may be cantilevered for use as brackets to carry 2 2-inch by 10-inch planks. The bearer for a cantilevered section shall be not more than 24 inches and the section shall be limited to 25 pounds per square foot.

(8) Cross bracing shall be installed across the width of the scaffold at both ends and at least every third set of posts horizontally and every fourth runner vertically. The bracing shall extend diagonally from the inner and outer runners upward to the next outer and inner runners.

(9) Longitudinal diagonal bracing on the outer rows of poles shall be installed at a 45-degree angle from near the base of the first outer post upward to the extreme top of the scaffold. Where the longitudinal length of the scaffold permits, the bracing shall be duplicated beginning at every fifth post. In a similar manner, longitudinal diagonal bracing shall also be installed from the last post extending back and upward toward the first post. Where conditions preclude the attachment of this bracing to the posts, it may be attached to the runners.

(10) Guys, ties, and braces shall be installed according to the scaffold manufacturer's recommendations or at the closest horizontal member to the 4-to-1 ratio height and be repeated vertically at locations of horizontal members every 20 feet (6.1 meters) or less thereafter for a scaffold 3 feet (0.91 meters) wide or less and every 26 feet (7.9 meters) or less thereafter for a scaffold more than 3 feet (0.9 meters) wide. The top guy, tie, or brace of a completed scaffold shall be placed no farther than a 4-to-1 ratio from the top. The top guys, ties, and braces shall be installed at each end of the scaffold and at horizontal intervals of not more than 30 feet (9.1 meters), measured from 1 end, not both, towards the other end. Outriggers, when used, may be considered a part of the base dimension. The outriggers shall be installed on both sides of the scaffold at each frame line.

(11) Table 3 reads as follows:

TABLE 3						
TUBE AND COUPLER SCAFFOLDS	LIGHT DUTY		MEDIUM		HEAVY	
Maximum uniformly distributed load	25 pounds per square foot		50 pounds per square foot		75 pounds per square foot	
Post spacing (longitudinal)	10 feet		8 feet		6 feet	
Post spacing (transverse)	6 feet		6 feet		6 feet	
Work levels	1	2	3	1	2	1
Maximum allowable additional planked levels	8	4	0	6	0	6
Maximum height (feet)	125	125	91	125	75	125

R 408.41224 Rescinded.

R 408.41225 Rescinded.

R 408.41226 Rescinded.

R 408.41227 Pump jack scaffolds.

Rule 1227. (1) Pump jack brackets, braces, and accessories shall be fabricated from metal plates and angles. Each bracket shall have 2 positive gripping mechanisms to prevent any failure or slippage.

(2) A pole shall comply with both of the following provisions:

(a) Be secured to the structure by rigid triangular bracing, or equivalent, at the bottom, top, and other points as necessary to provide a maximum vertical spacing of not more than 10 feet between braces. Each brace shall be capable of supporting not less than 225 pounds tension or compression.

(b) Be made of 2, 2 by 4s of Douglas fir, or the equivalent, or 2 continuous lengths made of 2 by 4s spiked together, with the seam parallel to the bracket, with 10D common nails at not more than 12 inches center to center, staggered uniformly from opposite outside edges. Each 2 by 4 may be spliced to make up a pole if the splice is constructed to develop the full strength of the member.

(3) Where the bracket must pass bracing already installed, an extra brace shall be used approximately 4 feet above the one to be passed until the original brace is reinstalled.

(4) If poles are made of wood, then the pole lumber shall be straight-grained and free of shakes, large loose or dead knots, and other defects that might impair strength.

R 408.41229 Rescinded.

SUSPENDED SCAFFOLDS

R 408.41231 Adjustable multipoint suspension scaffolds.

Rule 1231. (1) Only wire rope shall be used for suspending an adjustable multipoint suspension scaffold.

(2) The steel shackles or clevises with which the wire ropes are attached to the outrigger beams shall be placed directly over the hoisting drums.

R 408.41232 Multipoint suspended scaffold.

Rule 1232. (1) A multipoint suspended scaffold shall be suspended from structural components that are capable of supporting 4 times the maximum intended load.

(2) A multipoint suspended scaffold shall be light- or medium-duty scaffold only.

(3) If wire rope is used for the suspension of a multipoint suspended scaffold, a minimum of 2 wraps around the supporting structural members and around put logs shall be used and secured with the proper number of wire rope clips or fist grips.

(4) Softeners shall be used to prevent damage to wire rope that is used for suspension.

R 408.41233 Two-point adjustable suspension scaffolds; swing stage scaffold.

Rule 1233. (1) A 2-point adjustable suspension scaffold, also known as a swing stage scaffold platform, shall not be less than 20 inches nor more than 36 inches wide overall. The platform shall be securely fastened to the stirrups by U-bolts or by other equivalent means.

(2) The stirrups shall be designed with a support for a guardrail, intermediate rails, and toeboard.

(3) Rope and blocks that are used to support a 2-point adjustable scaffold shall have all of the following:

(a) Supporting ropes of 3/4-inch, first-quality manila rope or a synthetic rope of equivalent strength used with at least one 6-inch single and one 6-inch double block.

(b) Blocks that have sheaves which fit the size of the rope the blocks carry.

(c) Live ropes made fast to the scaffold in a manner to prevent displacement.

(d) The dead-end of the supporting rope connected to the block at the stirrup by means of an eye splice incorporating a thimble.

(4) A swing stage scaffold shall be limited to the following number of employees:

(a) For a scaffold designed for a working load of 500 pounds, not more than 2 employees shall be permitted to work at 1 time.

(b) For a scaffold designed for a working load of 750 pounds, not more than 3 employees shall be permitted to work at 1 time.

(5) Two or more scaffolds shall not be combined by bridging with planks or similar connecting links.

(6) Rollers or fenders shall be provided to prevent striking the building and to facilitate raising and lowering.

(7) The platform of a swing stage scaffold shall be 1 of the following types:

(a) Ladder-type platforms - The ladder-type platform shall be constructed to meet ANSI standard A10.8 "Scaffolding Safety Requirements," 1977 edition, as adopted in R 408.41202.

(b) Plank-type platform - The plank-type platform shall be composed of not less than two 2 by 10-inch unspliced planks which are laid straight and which are cleated together on the underside, with the cleats starting 6 inches from each end and spaced at 12-inch intervals.

(c) Beam-type platform - The beam platform shall have side stringers made of lumber that is not less than 2 by 6 inches set on edge. The span between hangers shall not be more than 12 feet. The flooring shall be supported on 2 by 6-inch crossbeams which are laid flat, which are set into the upper edge of the stringers with a snug fit at intervals of not more than 4 feet center to center, and which are securely nailed in place. The flooring shall be 1 by 6-inch lumber or 3/4-inch plywood and shall be securely nailed. Floorboards shall not be spaced more than 1/2 of an inch apart.

(d) Manufactured picks - When used, a manufactured pick shall conform to the requirements of R 408.41217(2) and (3).

R 408.41234 Multilevel suspension scaffolds.

Rule 1234. (1) A multilevel suspension scaffold shall have a separate fall prevention device that allows a drop of not more than 12 inches installed at each support point connected with a line to the scaffold.

(2) The device shall be attached to a wire rope safety line equivalent to the support rope, and the safety line shall be secured to a substantial member of the structure separate from the support rope and to the ground. If it is not possible to attach a safety line to the structure, then the safety line shall be attached to the outrigger.

(3) The multilevel suspension scaffold shall be in compliance with the provisions of R 408.41233 and 29 CFR 1926.452(v), as adopted by reference in R 408.41201.

(4) A support for a platform shall be attached directly to the support stirrup and not to any other platform.

R 408.41235 Single-point adjustable suspension scaffolds.

Rule 1235. A single-point adjustable suspension scaffold shall travel only in a vertical line.

R 408.41236 Needle beam scaffolds.

Rule 1236. (1) A needle beam scaffold shall not be altered or moved while in use.

(2) The scaffold planking shall be secured against displacement. Cleats are not an adequate means of attachment.

(3) Ropes or hangers shall be used for supports, except that 1 end of a needle beam scaffold may be supported by and secured to a permanent structural member.

R 408.41237 Boatswain's chair.

Rule 1237. (1) Two 5/8-inch, first-quality manila rope slings or synthetic rope of equivalent strength shall be reeved through the 4 seat holes so as to cross each other on the underside. Where an employee is using a heat or spark-producing process, such as gas welding or cutting, a protected 3/8-inch wire rope shall be used in place of fiber rope.

(2) The tackle shall consist of bearing or bushed blocks and 5/8-inch, first grade manila rope or its equivalent. The block shall be secured to roof irons, hooks, or other objects that are secured. Tiebacks shall be installed at right angles to the face of the building and shall be secured to the roof hooks and the building.

R 408.41238 Float scaffolds.

Rule 1238. (1) A float scaffold shall be constructed of not less than 3/4-inch exterior plywood or equivalent material. The platform shall be not more than 3 by 6 feet in size, and the ends of the platform shall project 6 inches beyond the outer edge of the bearers.

(2) The plywood shall be securely fastened to 2- by 4- inch bearers which are made of select lumber that is free of knots and other defects and which project 6 inches beyond the platforms on each side. The plywood shall be reinforced with a diagonal brace that runs from bearer to bearer beneath the platform.

(3) An edging of wood not less than 1 by 2 inches, or its equivalent, shall be secured around all sides of the platform to prevent tools from rolling off.

(4) Supporting ropes shall be 1-inch manila rope, or its equivalent, and shall be free of defects.

(5) Rope connections shall be made in a manner that prevents the platform from shifting or slipping. The rope shall be arranged to do all of the following:

(a) Pass under the platform.

(b) Be hitched around the end of each bearer on each side.

(c) Provide 4 ends that shall be securely fastened to an overhead support.

(6) Not more than 2 employees and necessary light tools shall occupy a float scaffold.

(7) Each employee on a float scaffold shall be protected by a personal fall arrest system.

R 408.41239 Rescinded.

R 408.41240 Rescinded.

MOBILE SCAFFOLDS

R 408.41241 Mobile scaffolds.

Rule 1241. (1) When a freestanding mobile scaffold is used, the height shall not be more than 4 times the minimum base dimension.

(2) Outriggers, when used, may be considered as part of the base dimension. The outriggers shall be installed on both sides of the scaffold at each frame line.

(3) Locking devices shall be used to secure the casters to the frame or adjusting screw. The adjusting screw shall not extend more than 12 inches. The casters shall be provided with a positive locking device to prevent movement of the scaffold. The device shall be used when the scaffold is in use, except where the work platform is 4 feet or less from the floor.

(4) Vertical members of the scaffold shall be braced by cross bracing and diagonal bracing. Not less than 2 horizontal diagonal braces shall be installed, 1 as close to the casters as possible, at intervals of not more than 4 times the least-based dimension. The horizontal diagonal brace may be omitted on a scaffold that is specifically designed to absorb racking.

(5) A scaffold platform shall cover the full width of the scaffold, except for a necessary entrance opening. A platform shall be secured in place. A platform shall not extend outward beyond the base supports of the scaffold unless outrigger frames or equivalent devices are used to ensure stability.

(6) A ladder or stairway that is provided on a manually propelled mobile scaffold shall be affixed or built into the scaffold and shall be so located that, when in use, the ladder or stairway does not have a tendency to tip the scaffold. A landing platform shall be provided at intervals of not more than 30 feet.

(7) In place of a ladder or stairway, the requirements of R 408.41211(2) may be complied with.

(8) Only manual force shall be used to move a scaffold covered by this rule. The force shall be applied near or as close to the base as practical, except for a scaffold with a work platform that is 4 feet or less from the floor.

(9) When being used, a mobile scaffold shall rest upon a suitable footing and shall stand plumb. Where leveling of the scaffold is necessary, screw jacks or an equivalent means shall be used.

(10) An employer shall not allow an employee to ride on a mobile scaffold, unless all of the following conditions exist:

(a) The floor or surface is within 3 degrees of level and is free from pits, holes, or obstructions.

(b) The minimum base dimension of the scaffold when ready for rolling is not less than 1/2 of the height.

(c) The casters are equipped with rubber or similar resilient tires.

(d) All tools and materials are secured or removed from the platform before the mobile scaffold is moved.

(e) The scaffold is equipped with guardrails on all sides.

(f) Before a scaffold is moved, each employee on the scaffold is made aware of the move.

(11) A mobile scaffold shall be in compliance with the applicable provisions of R 408.41217, R 408.41218, R 408.41223, and 29 CFR 1926.452(c), as adopted by reference in R 408.41201.

(12) A power system used to propel a mobile scaffold shall be designed to propel a mobile scaffold. A forklift, truck, similar motor vehicle, or add-on motor shall not be used to propel a scaffold unless the scaffold is designed to be propelled by a forklift, truck, similar motor vehicle, or add-on motor.

(13) If a power system is used to propel a scaffold, then the propelling force shall be applied directly to the wheels and shall not produce a speed of more than 1 foot per second (0.3 meters per second).

(14) An employee shall not be on any part of a powered mobile scaffold that extends outward beyond the wheels, casters, or other supports.

(15) A powered mobile scaffold shall be stabilized to prevent tipping during movement.

R 408.41243 Rough terrain forklift truck scaffolds; equipment requirements; employee safety requirements.

Rule 1243. (1) The scaffold platform shall be attached to the forks by enclosed sleeves and shall be secured against the back of the forks with a mechanical device so that the platform cannot tip or slip.

(2) A work platform shall be in compliance with all of the following requirements:

(a) Except for the guardrail system as specified in Construction Safety Standard Part 21. "Guarding of Walking and Working Areas," as referenced in R 408.41201, be of welded mild steel construction that has a minimum safety factor of 4 times the maximum intended load.

(b) Have a continuous guardrail system constructed as follows:

(i) Have a top rail which is located not less than 36 inches, nor more than 42 inches, above the platform floor and which is constructed to withstand a minimum of 200 pounds of force in any direction.

(ii) Have a midrail which is installed at mid-height between the top rail and platform floor and which is constructed to withstand a 200-pound side thrust.

(iii) Have a toeboard which is not less than 4 inches in nominal height and which is installed not more than 1/4 of an inch above the floor around the periphery of the work platform. If the platform has a gate, then the toeboard shall be installed on the gate.

(c) Have a wood planking, steel plate, or a steel grating bolted or welded to the bottom of the platform and be maintained free of slip or trip hazards.

(d) Have a permanently affixed sign on the platform that specifies the maximum number of passengers allowed, the work platform identification number, and the maximum rated load.

(e) Be easily identifiable by high-visibility color or marking.

(3) The work platform shall be level when in use.

(4) If an employee is elevated in a platform on a variable reach lift truck, a personal fall arrest system, including the anchorage required in Construction Safety Standard Part 45. "Fall Protection," and Construction Safety and Health Standard Part 6. "Personal Protective Equipment," as referenced in R 408.41201, is required and shall be worn when an employee is elevated.

(5) The rough terrain fork truck or the lift truck shall rest on firm footing. Leveling devices and outriggers shall be used where provided on equipment.

(6) A trained operator shall remain at the operator station of a lift truck to control the lift truck while an employee is elevated. The lift truck control or controls shall be in neutral and the parking brake set. The operator of the lift truck scaffold platform shall be able to see the elevated platform at all times.

(7) A lift truck platform shall be returned to the ground before a lift truck is repositioned. The forklift shall be moved as close to the work area as possible for final positioning. An employee shall exit the landed platform and reboard the platform only after the lift truck repositioning is completed.

(8) The combined mass weight of the platform, load, and the employee shall not be more than 1/3 of the rated capacity of the rough terrain forklift truck on which the platform is used.

(9) An employee shall maintain firm footing on the platform floor. Railings, planks, ladders, or other materials shall not be used on the platform to achieve reach or height.

(10) The guardrail system of the platform shall not be used to support any of the following:

- (a) Materials.
- (b) Other work platforms.
- (c) Employees.

(11) The platform shall be lowered to ground level for an employee to enter or exit, except where elevated work areas are inaccessible or hazardous to reach. An employee may exit the platform with the knowledge and consent of the employer. When exiting to unguarded work areas, fall protection shall be provided and used as required in Construction Safety Standard Part 45. "Fall Protection," as referenced in R 408.41201. An employee shall not climb on any part of a lift truck when attempting to enter or exit the platform.

(12) A platform shall not be modified if the modification is detrimental to its safe use.

(13) Floor dimensions parallel to the truck longitudinal centerline shall not be more than 2 times the load center distance listed on the rough terrain forklift truck nameplate. The floor dimension width shall not be more than the overall width of the truck measured across the load-bearing tires plus 10 inches (250 mm) on either side. The minimum space for each employee on the platform shall be not less than 18 inches (450 mm) in either direction.

(14) A wood pallet shall not be used as a platform for lift truck scaffolds.

(15) If arc welding is performed by an employee on the platform, then the electrode holders shall be protected from contact with the metal components of the work platform.

(16) A work platform shall not be used during high winds, electrical storms, snow, ice, sleet, or other adverse weather conditions that could affect the safety of the employees on the work platform or the operator of the truck.

R 408.41245 Operator training.

Rule 1245. An employer shall ensure that an employee has been trained before the employee's assignment as an operator of a rough terrain forklift truck that is used to elevate employees. An employee shall be trained in all of the following areas:

- (a) The capabilities of the equipment and its attachments.
- (b) The purpose, use, and limitations of the controls.
- (c) How to make daily checks.

AUXILIARY SUPPORTED SCAFFOLDS

R 408.41251 Outrigger scaffolds.

Rule 1251. (1) The inboard end of an outrigger beam measured from the fulcrum point to anchorage point shall be not less than 1 1/2 times the outboard end in length. The beams shall rest on edge, the sides shall be plumb, and the edges shall be horizontal. The fulcrum point of the beam shall rest on a secure bearing not less than 6 inches in each horizontal dimension. The beam shall be secured in place against movement and shall be securely braced at the fulcrum point against tipping.

(2) The inboard end of an outrigger beam shall be securely anchored either by means of 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 if necessary. The inboard end of an outrigger beam shall be secured against tipping, and the entire supporting structure shall be securely braced in both directions to prevent any horizontal movement.

(3) An outrigger scaffold shall be constructed as prescribed in table 4.

(4) Planking shall be laid tight and shall extend to within 3 inches of the building wall. Planking shall be secured to the outriggers.

(5) A scaffold and scaffold components shall be designed by a qualified person who is knowledgeable in scaffolding and shall be constructed and loaded pursuant to the design.

(6) Table 4 reads as follows:

TABLE 4 SPACING AND LENGTH OF OUTRIGGER SCAFFOLDS		
Maximum Scaffold Load	Light Duty 25 p.s.f.	Medium Duty 50 p.s.f.
Outrigger size	2 inches by 10 inches	3 inches by 10 inches
Maximum outrigger spacing	8 feet	6 feet
Maximum outrigger length	6 feet	6 feet

R 408.41253 Roofing brackets and crawling boards.

Rule 1253. (1) A roofing bracket shall be installed in a manner to maintain a level working surface.

(2) In addition to the pointed metal projections, the brackets shall be secured in place by nailing. When it is impractical to nail brackets, rope supports shall be used. When rope supports are used, they shall consist of first-quality manila rope of at least 3/4-inch diameter or its equivalent.

(3) A crawling board shall not be less than 1 by 10 inches, shall extend from the eave to the ridge of the roof, and shall be secured against displacement.

R 408.41254 Carpenter’s bracket scaffold.

Rule 1254. (1) Each bracket, except those for wooden bracket-form scaffolds, shall be attached to the supporting formwork or structure by means of 1 or more of the following:

- (a) Nails.
- (b) A metal stud attachment device.
- (c) 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.
- (d) For carpenters' bracket scaffolds only, by a bolt extending through to the opposite side of the structure's wall.

(2) The supporting brackets shall be fastened to the structure by 1 of the following:

- (a) Three-eighths-inch diameter bolts extending through the studs at the top of the bracket and projecting 3/4 inch beyond the nut and washer when in place.
- (b) Welding to a metal tank.
- (c) Hooked over a secured supporting member of the structure.

R 408.41255 Form Scaffolds.

Rule 1255. Metal brackets that are an integral part of the form shall be bolted or welded to the form. A folding-type bracket shall be secured by bolts or locking pins when in the extended position. Clip-on hook-on brackets may be used if the form walers are bolted to the form or secured by snap ties or shea-bolts extending through the form and anchored.

R 408.41256 Ladder jack scaffolds.

Rule 1256. (1) A ladder jack scaffold shall be used only for light duty on type I manufactured ladders at heights not more than 20 feet from the ground or floor level. The ladder shall be used as prescribed in Construction Safety Standard Part 11. "Fixed and Portable Ladders," as referenced in R 408.41201.

(2) All bearing points of a ladder jack shall be designed to bear on the side rails and the rungs, but if bearing on the rungs only, the bearing area shall be not less than 10 lineal inches per rung.

R 408.41256a Step, platform, and trestle ladder scaffolds.

Rule 1256a. (1) A scaffold platform shall not be placed higher than the second highest rung or step of the ladder supporting the platform.

(2) A ladder used in conjunction with a step, platform, and trestle ladder scaffold shall comply with the pertinent requirements of Construction Safety Standard Part 11. "Fixed and Portable Ladders," as referenced in R 408.41201, except that job-made ladders shall not be used to support a step, platform, or trestle scaffold.

(3) A ladder used to support a step, platform, and trestle ladder scaffold shall be placed, fastened, or equipped with a device to prevent slipping.

(4) A scaffold shall not be bridged to another scaffold.

R 408.41256b Rescinded.

WIRE, FIBER AND SYNTHETIC ROPE

R 408.41261 Wire rope.

Rule 1261. (1) A wire rope shall be inspected for defects by a competent person before each work shift and after every occurrence that could affect a rope's integrity. A rope shall be replaced if any of the following conditions exist:

(a) Physical damage that impairs the function and strength of the rope.

(b) Kinks that might impair the tracking or wrapping of rope around the drum or sheaves.

(c) Six randomly distributed broken wires in 1 rope lay or 3 broken wires in 1 strand in 1 rope lay.

(d) Abrasion, corrosion, scrubbing, flattening, or peening that has caused the loss of more than 1/3 of the original diameter of the outside wires.

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

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

(2) Wire rope that is bent to form an eye over a bolt or rod which has a diameter of less than 4 times the rope diameter shall be equipped with a metal thimble.

(3) 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.

(4) If wire rope clips are used on suspension scaffolds, then all of the following provisions apply:

(a) Clips shall be installed according to the manufacturer's recommendations.

(b) Clips shall be retightened to the manufacturer's recommendations after the initial loading.

(c) Clips shall be inspected and retightened to the manufacturer's recommendations at the start of each work shift.

(d) U-bolt clips shall not be used at the point of suspension for any scaffold hoist.

(e) If U-bolt clips are used, then 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.

(5) Wire rope shall not come in contact with sharp edges.

R 408.41264 Window jack scaffolds.

Rule 1264. (1) A window jack scaffold shall be used as a work platform for not more than 1 employee and only for the purpose of working at the window opening through which the jack is placed.

(2) A window jack shall not be used to support planks placed between one window jack and another or for other elements of scaffolding.

Non-mandatory Appendix A Rescinded.

1926.450 - 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. The criteria for aerial lifts are set out exclusively in §1926.453.

1926.450(b) Definitions.

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

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

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

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

Body harness means a design of straps which may be secured about the employee in a manner to distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders, with means for attaching it to other components of a personal fall arrest system. Brace means a rigid connection that holds one scaffold member in a fixed position with respect to another member, or to a building or structure.

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

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

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

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

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

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Needle beam scaffold means a platform suspended from needle beams.

Open sides and ends means the edges of a platform that are more than 14 inches (36 cm) away horizontally from a sturdy, continuous, vertical surface (such as a building wall) or a sturdy, continuous horizontal surface (such as a floor), or a point of access. Exception: For plastering and lathing operations the horizontal threshold distance is 18 inches (46 cm).

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

Outrigger beam (Thrustout) means the structural member of a suspension scaffold or outrigger scaffold which provides support for the scaffold by extending the scaffold point of attachment to a point out and away from the structure or building.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Single-pole scaffold means a supported scaffold consisting of a platform(s) resting on bearers, the outside ends of which are supported on runners secured to a single row of posts or uprights, and the inner ends of which are supported on or in a structure or building wall.

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

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

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

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

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

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

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

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

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

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

Tube and coupler scaffold means a supported or suspended scaffold consisting of a platform(s) supported by tubing, erected with coupling devices connecting uprights, braces, bearers, and runners.

Tubular welded frame scaffold (see "Fabricated frame scaffold").

Two-point suspension scaffold (swing stage) means a suspension scaffold consisting of a platform supported by hangers (stirrups) suspended by two ropes from overhead supports and equipped with means to permit the raising and lowering of the platform to desired work levels.

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

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

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

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

[61 FR 46025, Aug. 30, 1996; 75 FR 48133, Aug. 9, 2010]

1926.451 - GENERAL REQUIREMENTS

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

1926.451(a) "Capacity"

1926.451(a)(1) Except as provided in paragraphs (a)(2), (a)(3), (a)(4), (a)(5) and (g) of this section, each scaffold and scaffold component shall be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it.

1926.451(a)(2) Direct connections to roofs and floors, and counterweights used to balance adjustable suspension scaffolds, shall be capable of resisting at least 4 times the tipping moment imposed by the scaffold operating at the rated load of the hoist, or 1.5 (minimum) times the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater.

1926.451(a)(3) Each suspension rope, including connecting hardware, used on non-adjustable suspension scaffolds shall be capable of supporting, without failure, at least 6 times the maximum intended load applied or transmitted to that rope.

1926.451(a)(4) Each suspension rope, including connecting hardware, used on adjustable suspension scaffolds shall be capable of supporting, without failure, at least 6 times the maximum intended load applied or transmitted to that rope with the scaffold operating at either the rated load of the hoist, or 2 (minimum) times the stall load of the hoist, whichever is greater.

1926.451(a)(5) The stall load of any scaffold hoist shall not exceed 3 times its rated load.

1926.451(a)(6) Scaffolds shall be designed by a qualified person and shall be constructed and loaded in accordance with that design. Non-mandatory Appendix A to this subpart contains examples of criteria that will enable an employer to comply with paragraph (a) of this section.

1926.451(b) "Scaffold platform construction."

1926.451(b)(1) Each platform on all working levels of scaffolds shall be fully planked or decked between the front uprights and the guardrail supports as follows:

1926.451(b)(1)(i) Each platform unit (e.g., scaffold plank, fabricated plank, fabricated deck, or fabricated platform) shall be installed so that the space between adjacent units and the space between the platform and the uprights is no more than 1 inch (2.5 cm) wide, except where the employer can demonstrate that a wider space is necessary (for example, to fit around uprights when side brackets are used to extend the width of the platform).

1926.451(b)(1)(ii) Where the employer makes the 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.

29 CFR 1926.451(c)(2) to (iii) is replaced with R 408.41210(2) in these rules.

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

1926.451(e)(4)(viii) A landing platform at least 18 inches (45.7 cm) wide by at least 18 inches (45.7 cm) long shall be provided at each level.

1926.451(e)(4)(ix) Each scaffold stairway shall be at least 18 inches (45.7 cm) wide between stairrails.

1926.451(e)(4)(x) Treads and landings shall have slip-resistant surfaces.

1926.451(e)(4)(xi) Stairways shall be installed between 40 degrees and 60 degrees from the horizontal.

1926.451(e)(4)(xii) Guardrails meeting the requirements of paragraph (g)(4) of this section shall be provided on the open sides and ends of each landing.

1926.451(e)(4)(xiii) Riser height shall be uniform, within 1/4 inch, (0.6 cm) for each flight of stairs. Greater variations in riser height are allowed for the top and bottom steps of the entire system, not for each flight of stairs.

1926.451(e)(4)(xiv) Tread depth shall be uniform, within 1/4 inch, for each flight of stairs.

1926.451(e)(5) 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 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 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 top rail 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 top rail capacity, and at least 150 pounds (666 n) for guardrail systems with a minimum 200 pound top rail 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 top rail or midrail.

1926.451(g)(4)(xiv) Manila or plastic (or other synthetic) rope being used for top rails or mid rails 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 mid rail 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 top rail 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]

1926.452 - ADDITIONAL REQUIREMENTS APPLICABLE TO SPECIFIC TYPES OF SCAFFOLDS

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

1926.452(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]

1926.454 - TRAINING REQUIREMENTS

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

1926.454(a) The employer shall have each employee who performs work while on a scaffold trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards.

The training shall include the following areas, as applicable:

1926.454(a)(1) The nature of any electrical hazards, fall hazards and falling object hazards in the work area;

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]

1926 SUBPART L APPENDIX A - 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.....	40
2. Specific guidelines and tables.....	42
(a) Pole Scaffolds.....	42
Single pole wood pole scaffolds.....	42
Independent wood pole scaffolds.....	43
(b) Tube and coupler scaffolds.....	44
(c) Fabricated frame scaffolds.....	45
(d) Plasterers', decorators', and large area scaffolds.....	45
(e) Bricklayers' square scaffolds.....	45
(f) Horse scaffolds.....	45
(g) Form scaffolds and carpenters' bracket scaffolds.....	46
(h) Roof bracket scaffolds.....	47
(i) Outrigger scaffolds (single level).....	47
(j) Pump jack scaffolds.....	47
(k) Ladder jack scaffolds.....	47
(l) Window jack scaffolds.....	47
(m) Crawling boards (chicken ladders).....	47
(n) Step, platform, and trestle ladder scaffolds.....	47
(o) Single-point adjustable suspension scaffolds.....	47
(p) Two-point adjustable suspension scaffolds.....	47
(q)(1) Multi-point adjustable suspension scaffolds and stonemasons' multi-point adjustable suspension scaffolds.....	49
(q)(2) Masons' multi-point adjustable suspension scaffolds.....	49
(r) Catenary scaffolds.....	49
(s) Float (ship) scaffolds.....	49
(t) Interior hung scaffolds.....	49
(u) Needle beam scaffolds.....	50
(v) Multi-level suspension scaffolds.....	50
(w) Mobile Scaffolds.....	50
(x) Repair bracket scaffolds.....	50
(y) Stilts.....	50
(z) Tank builder's scaffold.....	50

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).
<p>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.</p>	

(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 or 3 x 4 in	2 x 10 in or 3 x 5 in
5 feet	2 x 6 in or 3 x 4 in	2 x 6 in or 3 x 4 in (rough)	2 x 10 in or 3 x 4 in	2 x 10 in or 3 x 5 in
6 feet	-	-	2 x 10 in or 3 x 4 in	2 x 10 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 feet 6 in
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.				

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 or 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 inch) OD steel tube or pipe and a maximum post spacing of 6 ft x 8 ft*	Nominal 2-1/2 in (2.375 inches) 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				
Number of working levels:	Maximum number of additional planked levels			Maximum height of scaffold (in feet)
	Light duty	Medium duty	Heavy duty	
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)(*)
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
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.	

(f) Horse scaffolds.

Maximum intended load (light duty):	25 lb/ft(2)(**)
Maximum intended load (medium duty):	50 lb/ft(2)(**)
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
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.	

(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 feet 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 in
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.

(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 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/ft(2). 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(g)(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 Sec. 1926.451(g)(4). Guardrail supports shall be located at no greater than 10 feet 6 inch intervals.

[61 FR 46025, Aug. 30, 1996; 77 FR 46950, Aug. 7, 2012]

1926 SUBPART L APPENDIX D 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]

1926 SUBPART L APPENDIX E - 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

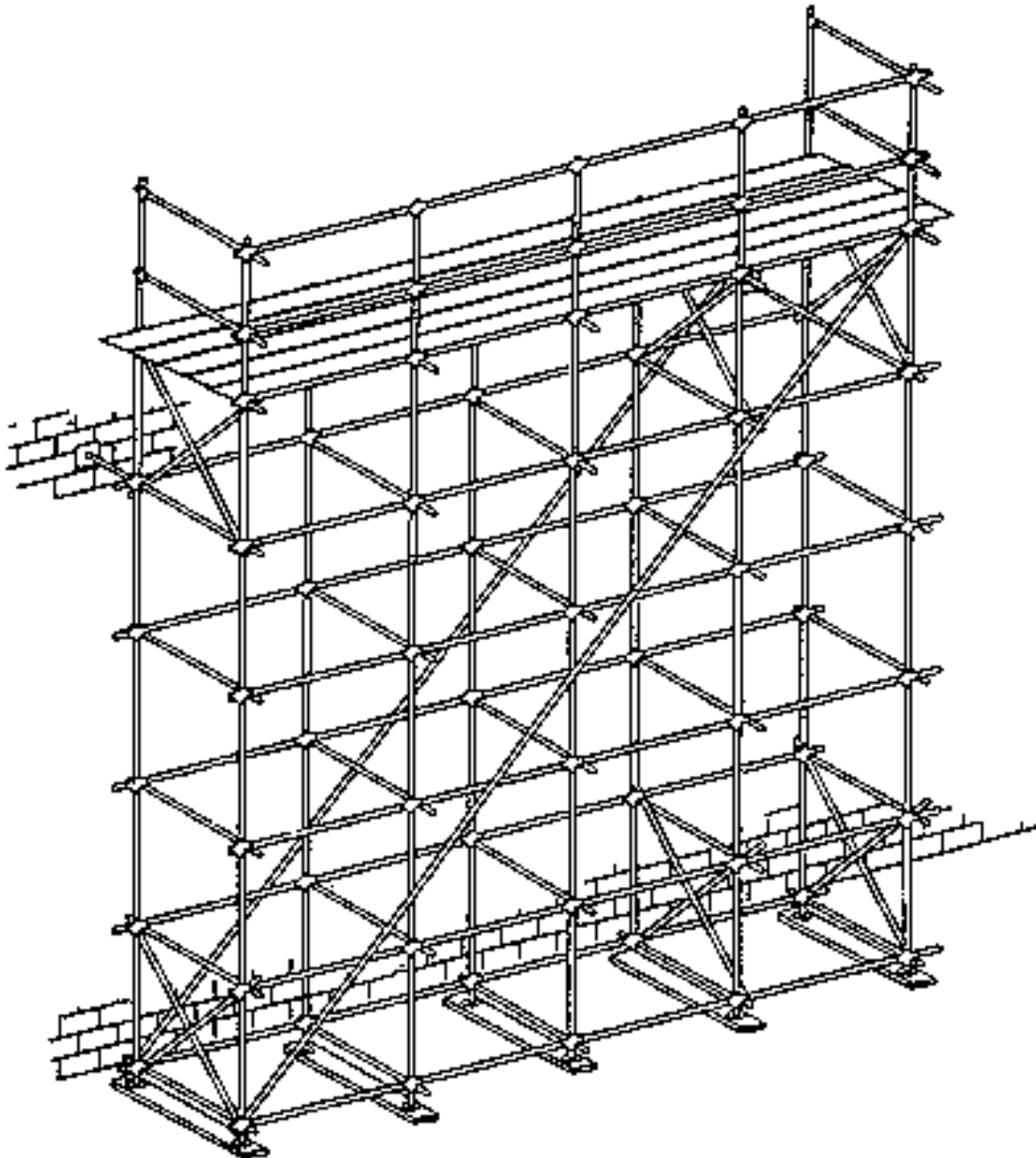


FIGURE 2

SUSPENDED SCAFFOLD PLATFORM WELDING PRECAUTIONS

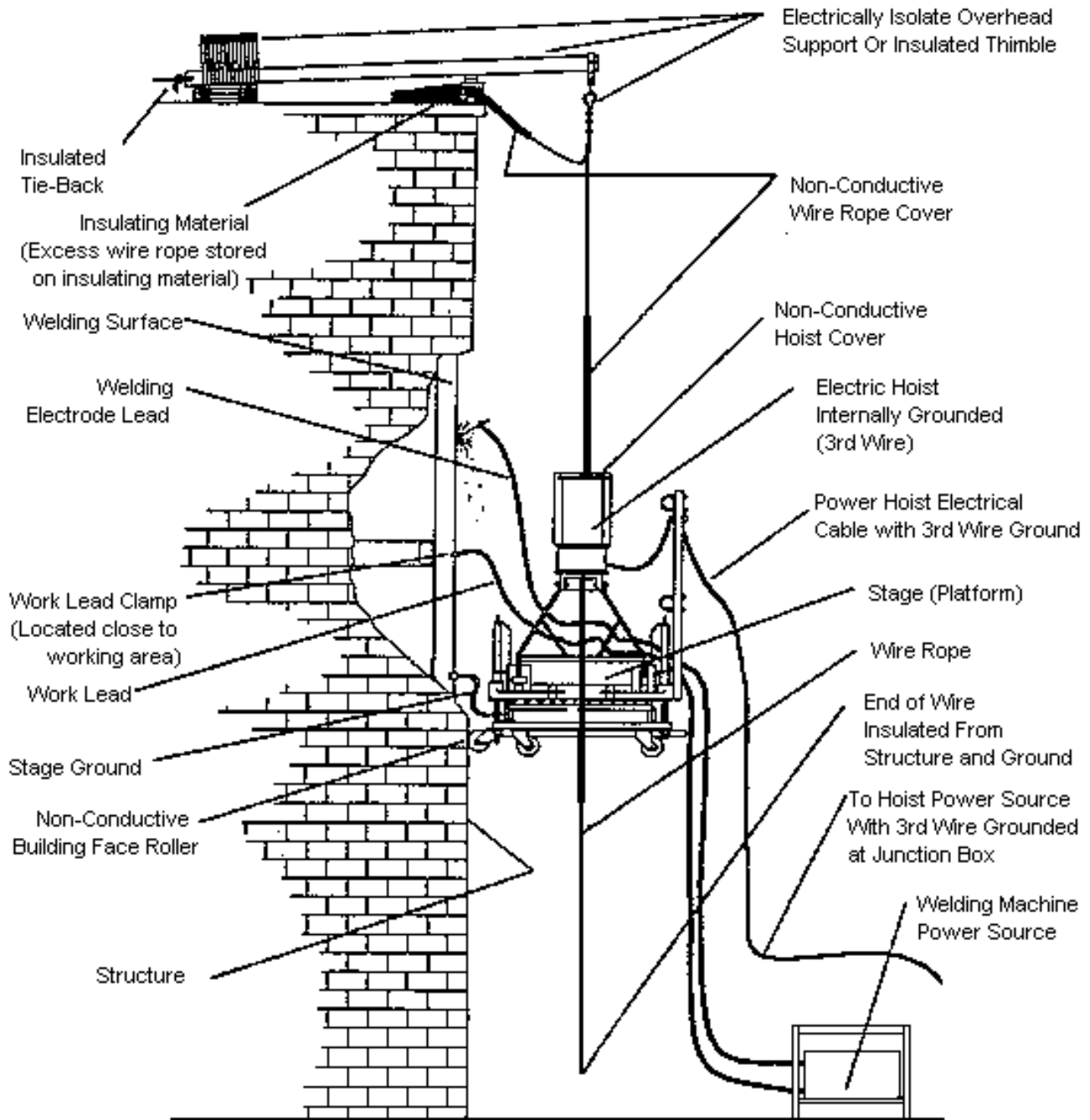


FIGURE 3

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

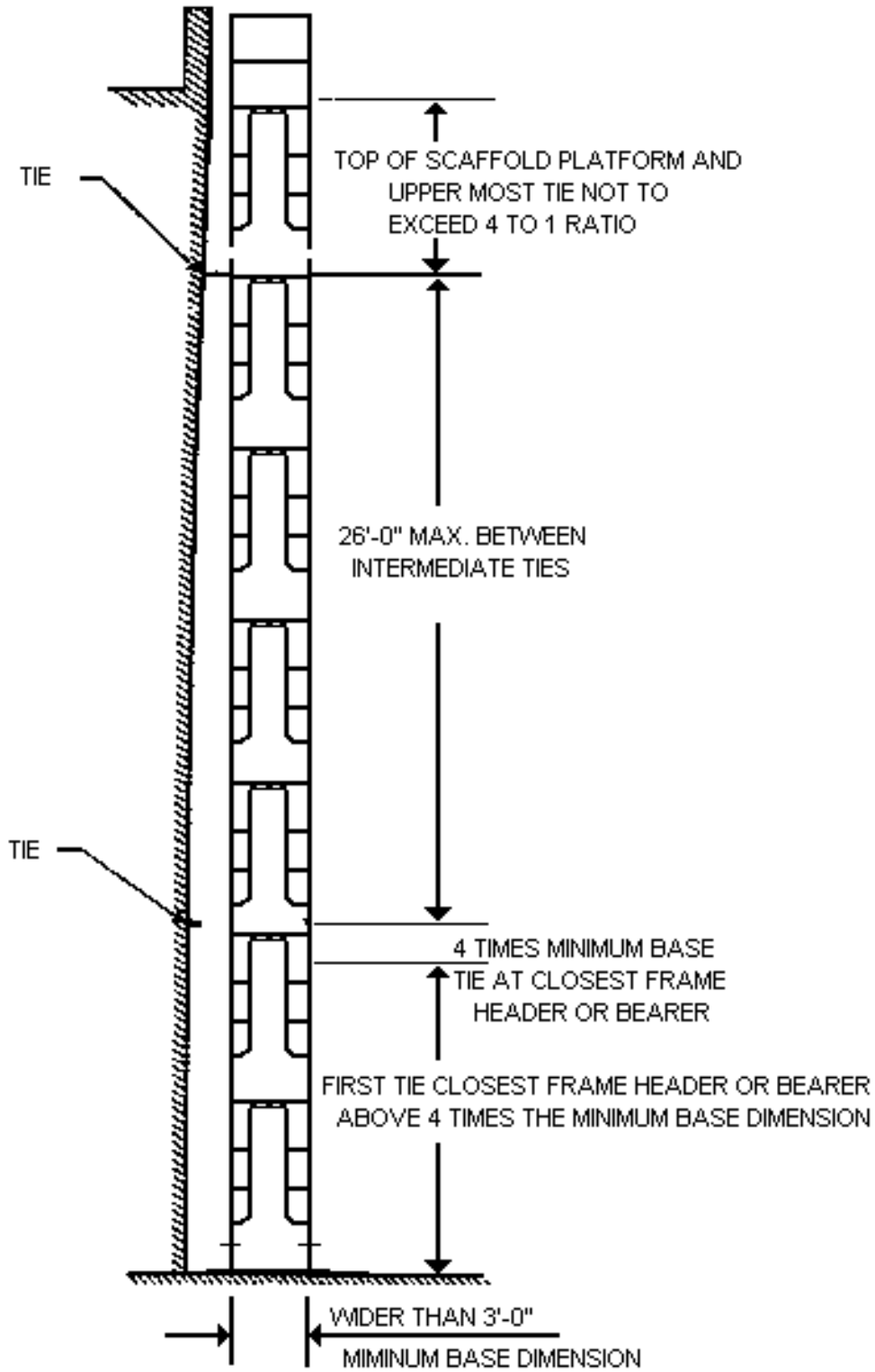


FIGURE 4

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

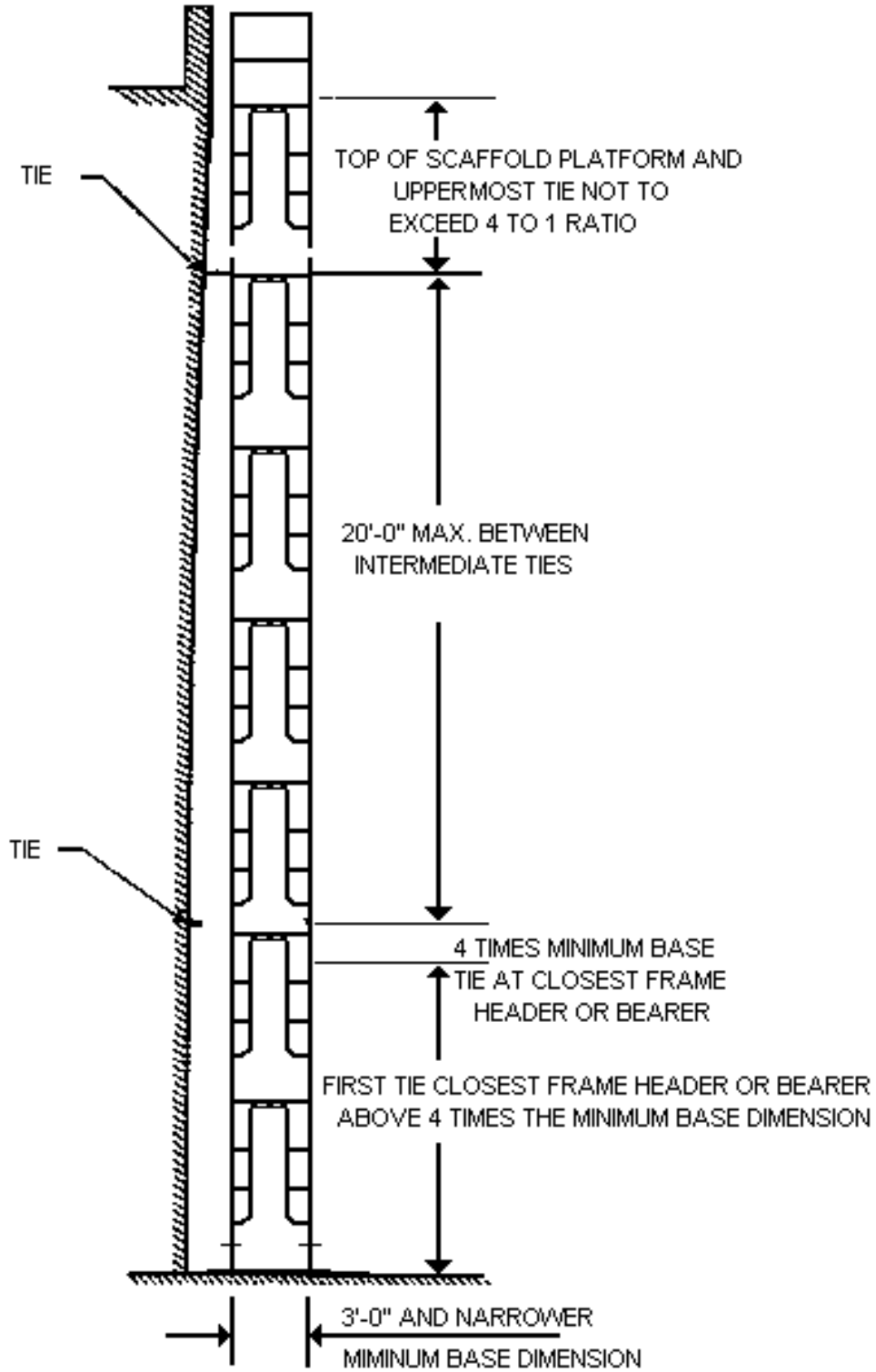


FIGURE 5
SYSTEM SCAFFOLD

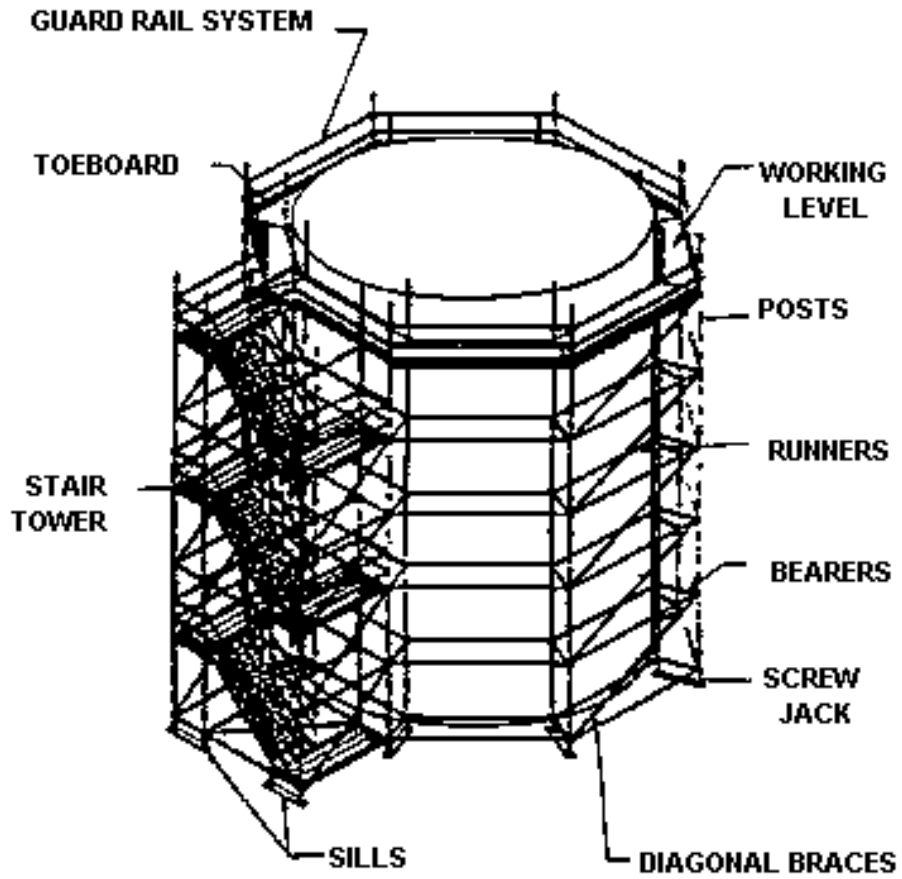
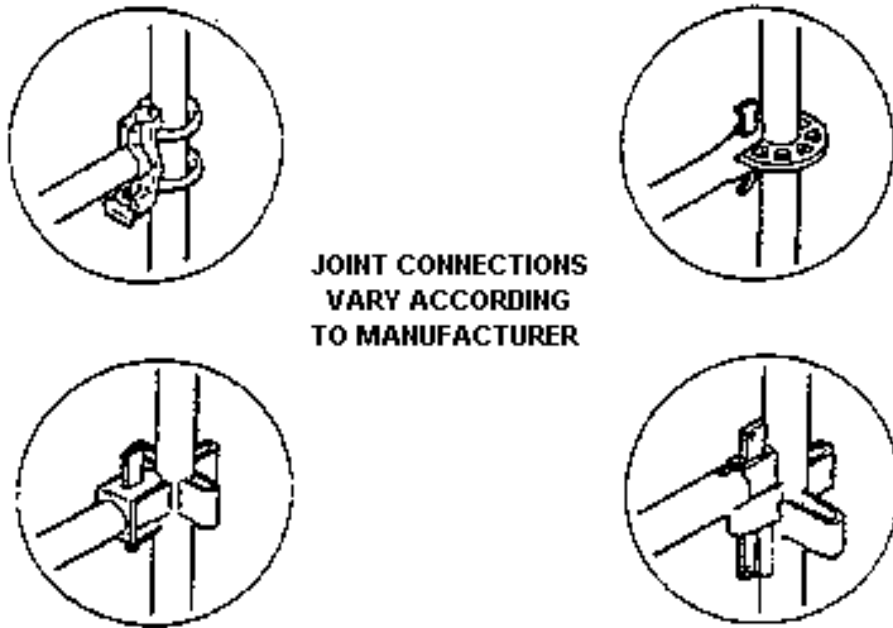


FIGURE 6

SPIB® DNS IND 65
KD19 5-DRY (7)
SCAFFOLD PLANK

Grade stamp courtesy of Southern Pine Inspection Bureau

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

Grade stamp courtesy of West Coast Lumber Inspection Bureau

FIGURE 7

TUBE AND COUPLER SCAFFOLD

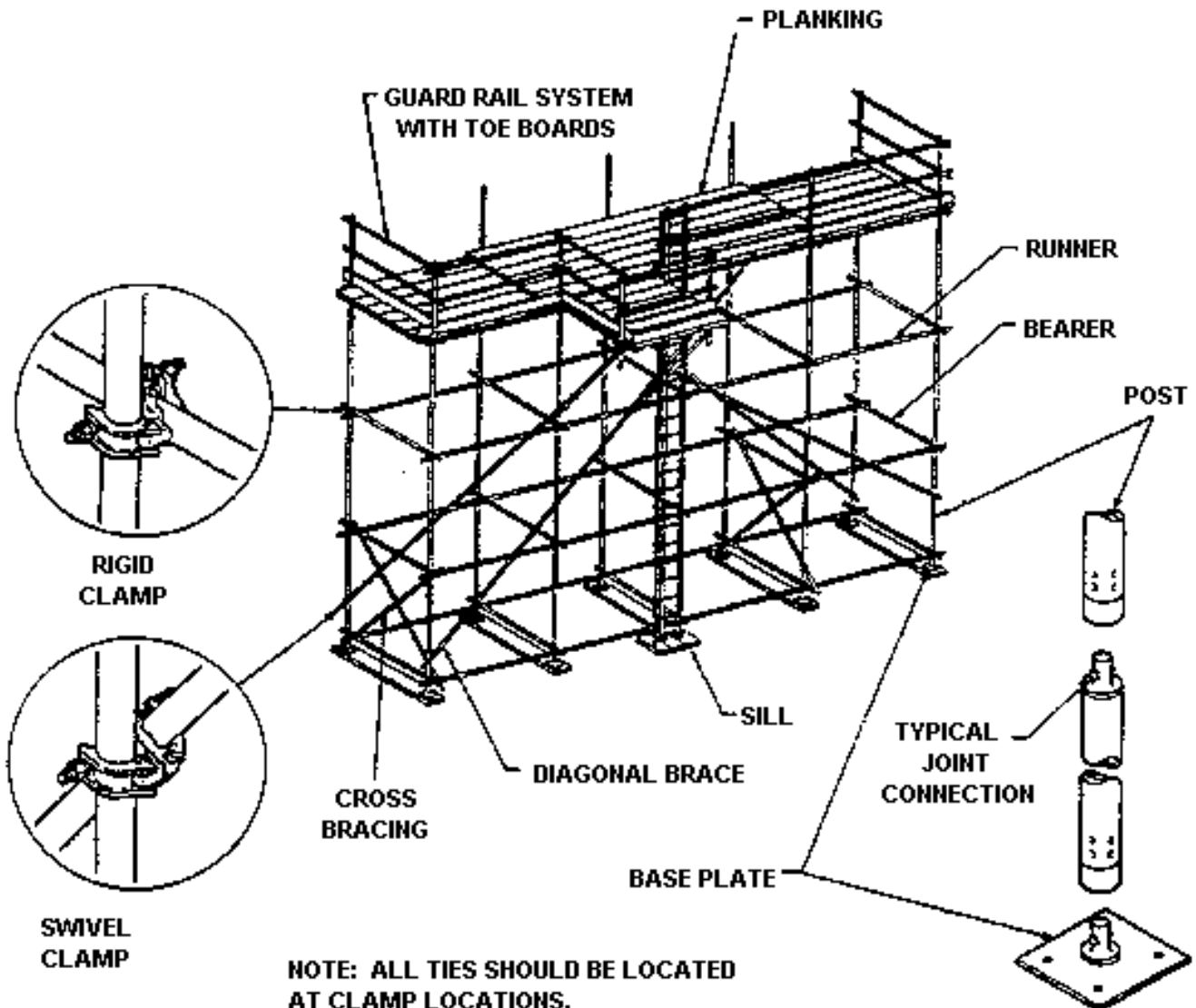
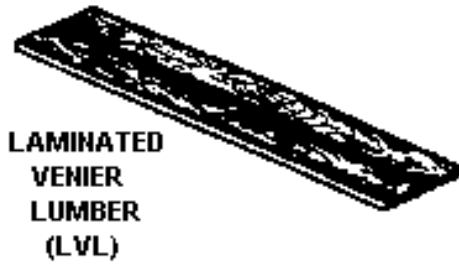


FIGURE 8

SCAFFOLDING WORK SURFACES



SCAFFOLD PLANKS

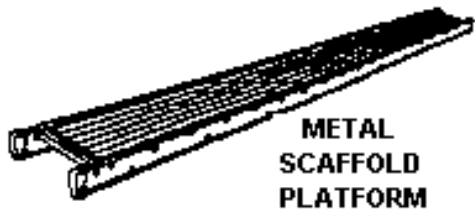
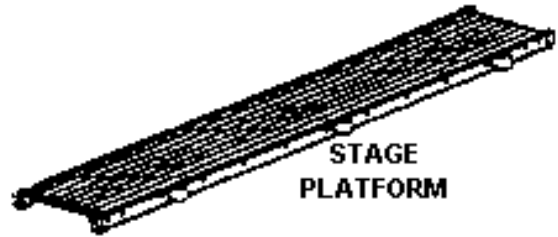
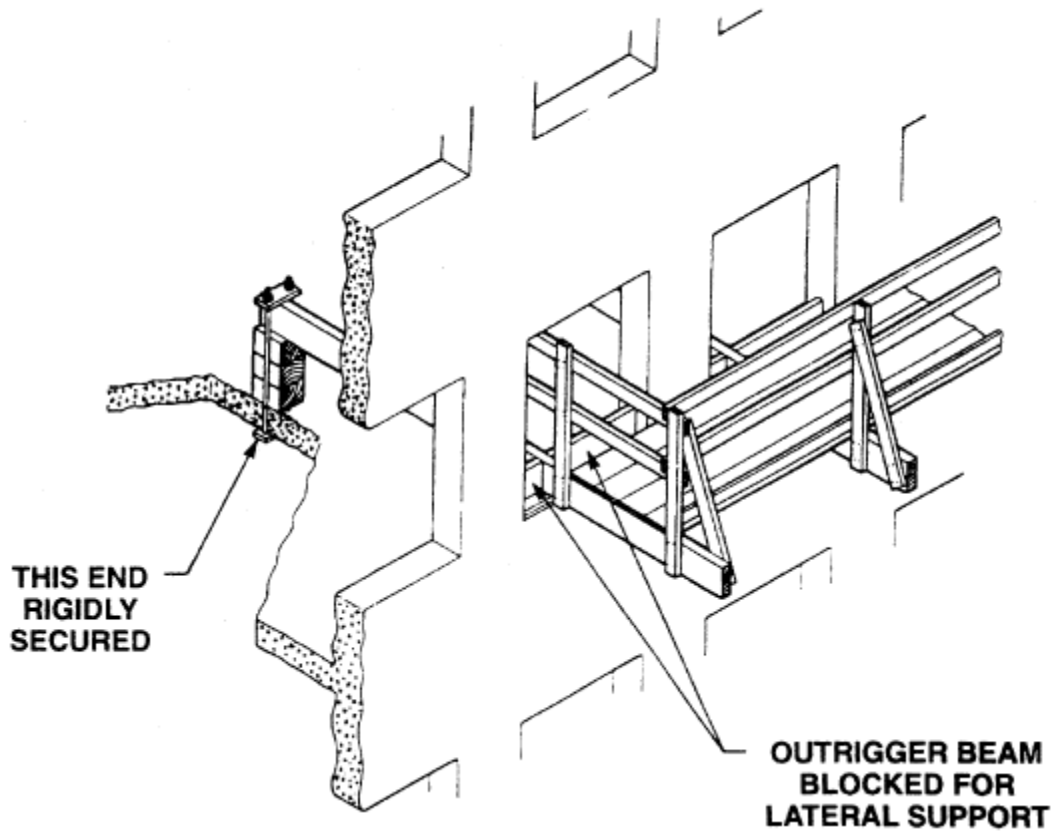


FIGURE 9

OUTRIGGER SCAFFOLD



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



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