MIOSHA Training Institute

MIOSHA Michigan Occupational Safety and Health Administration

Macomb Community College

Part 12
Scaffolds and Scaffold Platforms

Student Materials
Consultation Education and Training Division
Michigan Occupational Safety and Health Administration
Michigan Department of Labor and Economic Opportunity
www.michigan.gov/miosha
517-284-7720

MICHIGAN DEPARTMENT OF LABOR & ECONOMIC OPPORTUNITY

(Revised 03/24)

MIOSHA Michigan Occupational Safety and Health Administration

Part 12
Scaffolds and Scaffold Platforms

MTI Level Two Construction Compliance Course

Presented By:
Consultation Education and Training (CET) Division
Michigan Occupational Safety and Health Administration
Michigan Department of Labor and Economic Opportunity
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Objectives

- Reference sections of MIOSHA Part 12, Scaffolds and Scaffold Platforms
- Apply Part 12 requirements to the most commonly used scaffolds in construction
- Discuss common hazards, case studies, and best industry practices

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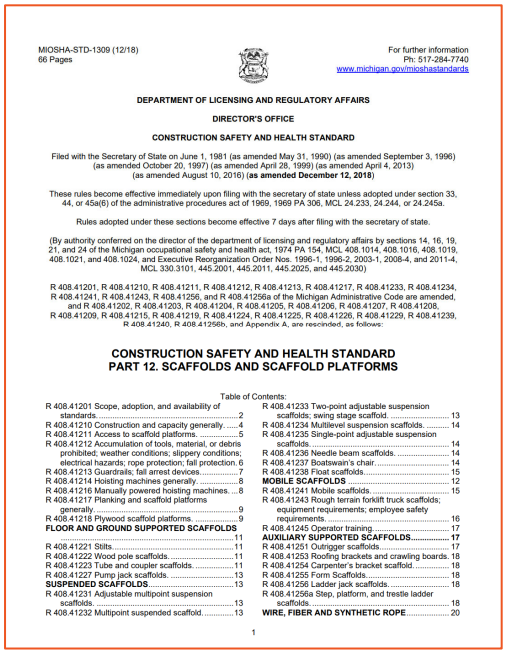

MIOSHA-STD-1309 (12/18)
66 Pages

For further information
Ph: 517-284-7740
www.michigan.gov/mioshastandards

DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS

DIRECTOR'S OFFICE

CONSTRUCTION SAFETY AND HEALTH STANDARD

Filed with the Secretary of State on June 1, 1981 (as amended May 31, 1990) (as amended September 3, 1996) (as amended October 20, 1997) (as amended April 28, 1999) (as amended April 4, 2013) (as amended August 10, 2016) (**as amended December 12, 2018**)

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.

Rules adopted under these sections become effective 7 days after filing with the secretary of state.

(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:

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As amended December 12, 2018

Introduction to the Standard

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Definition: Scaffold

1926.450(b)

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

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Definition: Competent Person

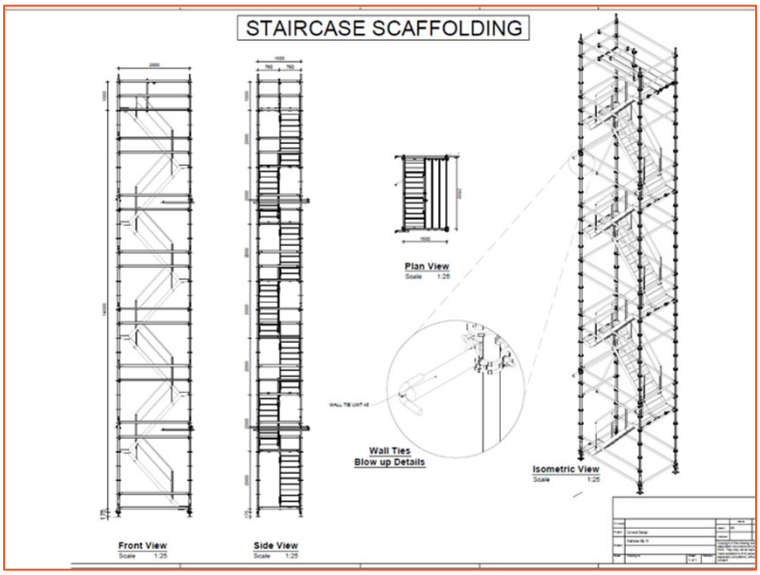
1926.450(b)

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.

1926.450(b)

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.

Definition: Qualified Person



Definition: Maximum Intended Load

1926.450(b)

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.

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Standard Layout

Part 12 is a blended standard with both of the following:

MIOSHA Rules Section

Scope; Floor and Ground Supported Scaffolds; Suspended Scaffolds; Mobile Scaffolds; Auxiliary Supported Scaffolds; Wire, Fiber, and Synthetic Rope

OSHA Rules Section

Scope; Application and Definitions; General Requirements; Additional Requirements; Training Requirements

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Scope of the Standard

Fed: 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.

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MI: These rules apply to scaffolds and scaffold platforms used in construction operations. The equipment may be commercially manufactured or job-built. These rules do not apply to crane or derrick suspended personnel platforms as prescribed in Construction Safety and Standard Part 10, Cranes and Derricks and Construction Standard Part 32, Aerial Work Platforms.

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Types of Scaffold

Part 12 breaks down scaffolding into four categories:

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Scaffold Activity:

Name the Types of Scaffold

- Take approximately five minutes to match a name with each of the various types of scaffolding pictured on the next slide

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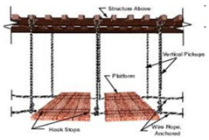
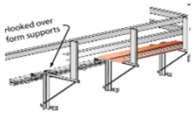
Activity: Name the Types of Scaffold

Choose from:

A. Wood pole **E.** Catenary
B. Pumpjack **F.** Trestle
C. Horse **G.** Carpenter bracket
D. Float **H.** Needle beam

1) _____ 

2) _____ 

3) _____ 

4) _____ 

5) _____ 

6) _____ 

7) _____ 

8) _____ 

MIOSHA MTI Part 12: Scaffolds 2012

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Common Scaffolds
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Common Scaffolds
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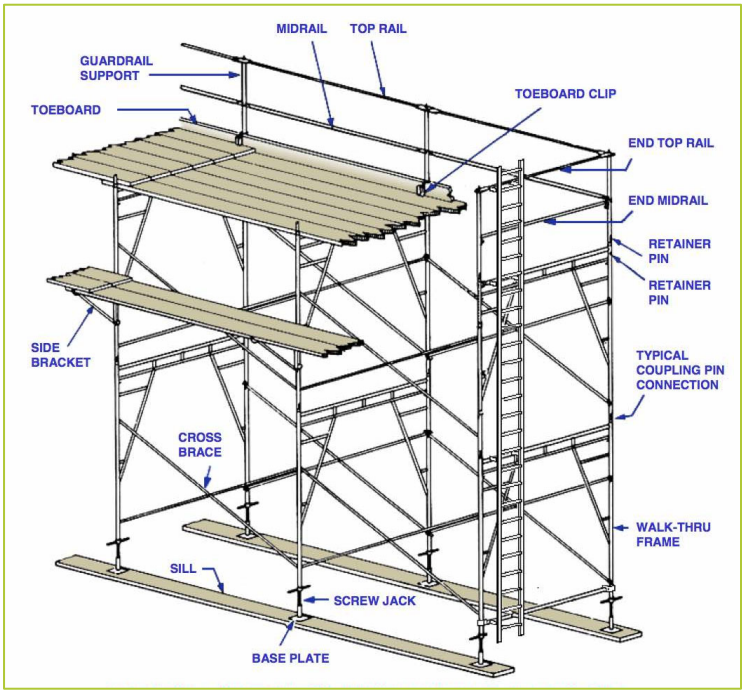
Typical Scaffold Components

Welded Frame Scaffold



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Scaffold Components Video

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Know Your Scaffold

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Scaffold Training

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.

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1926.454(a) CONTINUED

Scaffold Training

The training shall include the following areas, as applicable:

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

(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.

(3) The proper use of the scaffold, and the proper handling of materials on the scaffold.

(4) The maximum intended load and the load-carrying capacities of the scaffolds used.

(5) Any other pertinent requirements of this subpart.

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Scaffold Training

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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.

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Scaffold Training

1926.454(b) CONTINUED

The training shall include the following topics, as applicable:

(1) The nature of scaffold hazards.

(2) The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold in question.

(3) The design criteria, maximum intended load-carrying capacity, and intended use of the scaffold.

(4) Any other pertinent requirements of this subpart.

Scaffold Capacity

1926.451(a)(1)

Each scaffold and scaffold component shall be capable of supporting, without failure, its own weight and at least four times the maximum intended load applied or transmitted to it.

Scaffold Capacity

1926.451(a)(6)
Scaffolds shall be designed by a qualified person and shall be constructed and loaded in accordance with that design.

Scaffold Capacity

408.41210(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 block, 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.

Scaffold Capacity

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✓ Knowledge Check #1:

1. Scaffolds shall be designed by a _____ person and shall be constructed and loaded in accordance with that design.
2. Leveling jack adjusting screws (screw jacks) used with supported scaffolds shall not exceed a height of how many inches?
3. Scaffold poles, legs, posts, frames, and uprights shall bear on b___ p_____, along with m_____ or other adequate support.
4. Employees working on a scaffold shall be trained to recognize h_____ associated with the type of scaffold being used.

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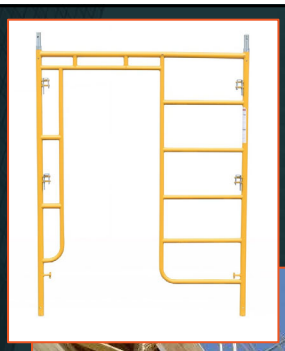

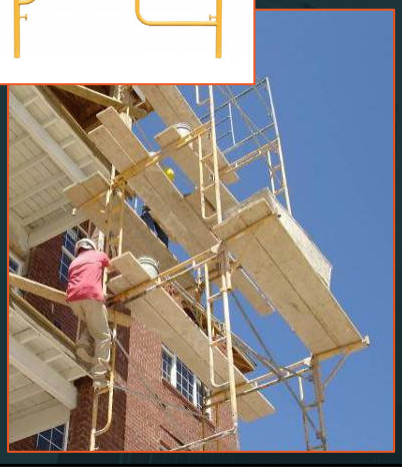

Scaffold Access

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408. 41211(1)

Access to a scaffold platform shall be provided by one or more of the following:

- A ladder
- Hook-on or attachable metal ladders
- Step or hook-on, stair-type accessories
- Direct access from an adjacent scaffold, the structure, or personnel hoist not more than 14" horizontally and 24" vertically from the other surface
- A ramp, runway, or stairway

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1926.451(e)(9)

Access for employees erecting or dismantling supported scaffolds shall be in accordance with the following:

Scaffold Access

- A safe means of access where feasible and does not create a greater hazard
- Hook-on or attachable ladders installed as soon safe for installation and use
- Welded (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
- Cross braces on welded frame scaffolds shall not be used as access or egress

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Scaffold Platforms and Planking

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)(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:

- Each platform unit shall be installed so that the space between adjacent units and the space between the platform and the uprights is no more than one inch wide, except where the employer can demonstrate that a wider space is necessary
- Where the employer makes the demonstration provided, 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

Exception: 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.

Scaffold Platforms and Planking

Scaffold Platforms and Planking

1926.451(b)(2)

- Each scaffold platform and walkway shall be at least 18 inches wide
- Each ladder jack scaffold, top plate bracket scaffold, roof bracket scaffold, and pump jack scaffold shall be at least 12 inches wide
- 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 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

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Scaffold Platforms and Planking

408.41217(1)

- All wood plank shall be scaffold-grade, a minimum of 1500 psi fiber stress value
- Plank shall be not less than 2" x 10"
- Platforms shall consist of a minimum of two plank laid side by side
- Each platform on all working levels shall be fully planked or decked between uprights
- Spaces between platform and uprights shall not be more than 9 ½ inches

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Scaffold Platforms and Planking

408.41217(2)

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

Scaffold Platforms and Planking

408.41217(5)
Planking shall comply with all of the following provisions:

- Extend over the bearer not less than six inches, but not more than 12 inches
- Be cleated or otherwise fastened to prevent shifting and be uniform in thickness, except when lapped diagonally
- Where lapped 16-foot plank are used, tie downs are not required unless wind uplift

Scaffold Platforms and Planking

408.41217(6)

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

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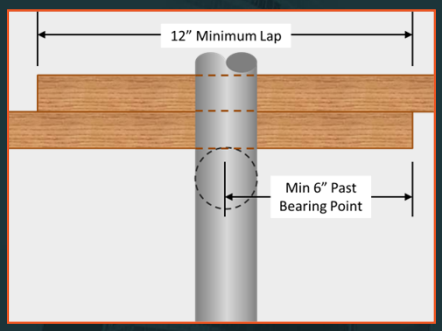
Scaffold Platforms and Planking

408.41217(7)

Where plank are lapped, each plank shall lap its bearer not less than six inches, which will provide a minimum overlap of 12 inches.



Properly Lapped

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Improperly Lapped

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Scaffold Platforms and Planking

408.41217(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, except that the maximum distance for plastering and lathing operations shall be not more than 18 inches.

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Scaffold Platforms and Planking

408.41218

(1) If plywood is used as a work platform, the plywood shall be supported by 2" X 10" plank. The plank shall support two 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 plank.

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

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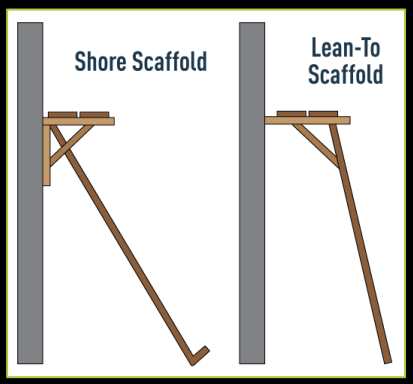
Scaffold Use

1926.451(f)(2) The use of shore or lean-to scaffolds is prohibited.



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Scaffold Use

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 that could affect a scaffold's structural integrity.

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Scaffold Use

- 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.

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Scaffold Use

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.

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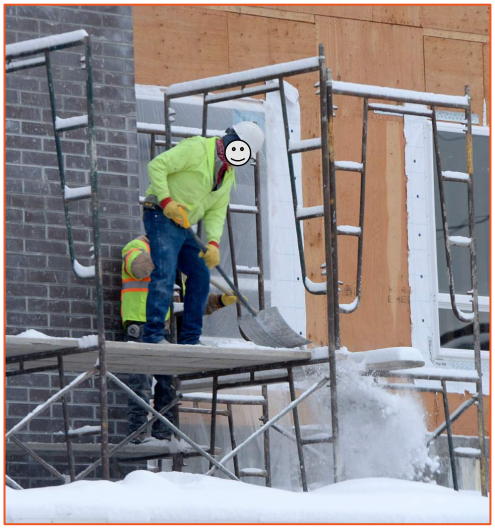
1926.451(f)(8)
Employees shall be prohibited from working on scaffolds covered with snow, ice, or other slippery material except as necessary for removal of such materials.

Scaffold Use



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Scaffold Use

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.

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Scaffold Use

1926.451(f)(15)

A ladder shall not be used on scaffolds to increase the working level height of employees, except on large area scaffolds (dance floor).

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✓ Knowledge Check #2:

1. Fully decked, at least 2” x 10”, and scaffold grade are all requirements when using wooden plank as a scaffold platform.
   a) True b) False
2. Cross braces _____ be used to access a welded frame scaffold. (can/cannot)
3. Hook-on type manufactured work platforms may be used if they are s_____ to the b_____.
4. Before when and after what shall a competent person inspect a scaffold and its components for visible defects?
5. When can workers stand on a bucket to gain height on a scaffold? When can workers stand on a ladder to gain height on a scaffold?

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OSHA v-Tool Prevention Video

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Falls in Construction - Scaffold

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Scaffold - Falling Object Protection

1926.451(h)(1)

In addition to wearing hard hats, 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
- Debris nets
- Catch platforms
- Guardrails
- Canopy structures

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Scaffold - Wind Protection

408.41212(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.

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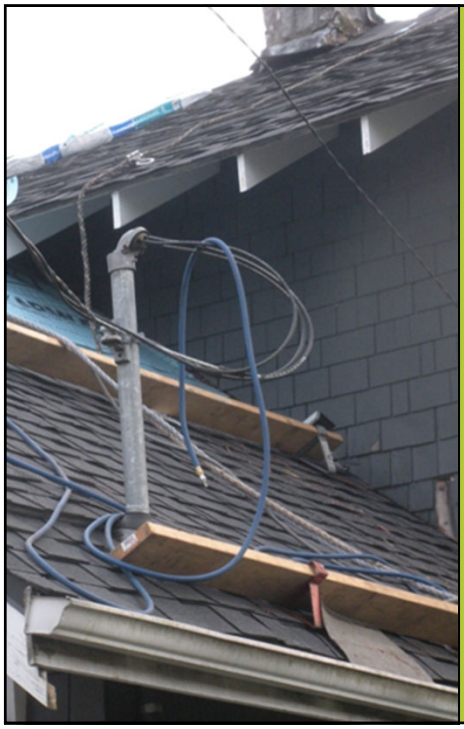

Scaffold - Electricity Protection

408.41212(4)

An employee shall not be allowed within ten feet of uninsulated electrical energized lines.

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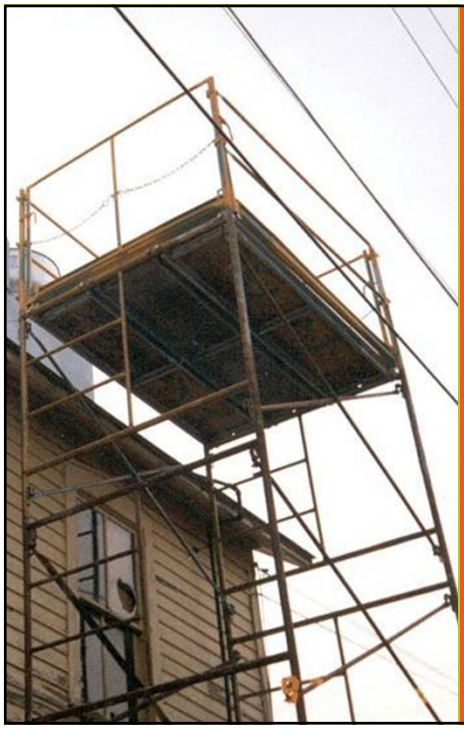

Scaffold - Electricity Protection

408.41212(5)

Before a scaffold is erected within ten feet of an electrical line, the utility or property owner shall be consulted. An electrical line or electrical apparatus shall be 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 set forth in Table 1 shall be maintained between the scaffold, employee, or material, whichever is closer.

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Scaffold - Electricity Protection

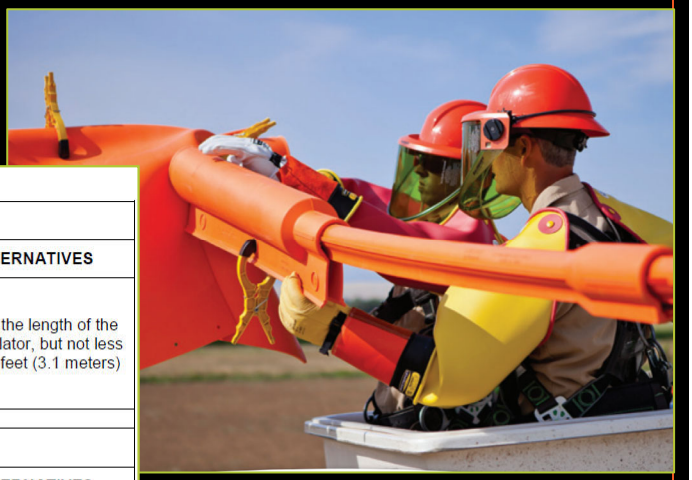

TABLE 1

INSULATED LINES		
VOLTAGE	**MINIMUM DISTANCE**	**ALTERNATIVES**
Less than 300 volts	3 feet (0.9 meters)	2 times the length of the line insulator, but not less than 10 feet (3.1 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	
UNINSULATED LINES		
VOLTAGE	**MINIMUM DISTANCE**	**ALTERNATIVES**
Less than 50 kilovolts	10 feet (3.1 meters)	2 times the length of the line insulator, but not less than 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	

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Scaffold - Fall Protection

408.41213(1)
A guardrail shall be installed on any open side or end of a scaffold work platform that is ten feet or more above the floor or ground.

- Must withstand 200-pound thrust
- Top rail height must be between 38 inches and 45 inches
- Vertical supporting posts not more than eight feet apart

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Scaffold - Fall Protection

408.41213(5)
A cross brace may be used as part of the guardrail system as follows:

- If pivot occurs from 36” to 48” above the platform…install a midrail
- If pivot occurs from 18” to 36” above the platform…install a top rail
- If pivot occurs less than 18” or more than 48”…install both

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Scaffold - Fall Protection

408.41213(6)

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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 to the employees erecting or dismantling scaffolds when it is feasible and does not create a greater hazard.

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Supported Scaffolds

1926.450(b)
Means one or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support.

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Supported Scaffold

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:

(c)(1)(i) Guys, ties, and braces shall be installed at locations where horizontal members support both inner and outer legs.

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Supported Scaffold

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 26 feet or less thereafter for scaffolds greater than three feet 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 (measured from one end [not both] towards the other).

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Supported Scaffold

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.

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Supported Scaffold

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

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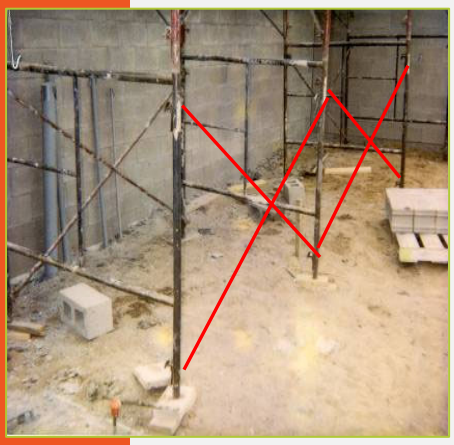
Supported Scaffold

1926.451(c)(3)
Supported scaffold poles, legs, posts, frames, and uprights shall be plumb and braced to prevent swaying and displacement.



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✓ Knowledge Check #3:

1. Scaffolds shall be erected, moved, dismantled, or altered only under the supervision and direction of a _____ person.
2. A guardrail shall be installed on any open side or end of a scaffold work platform that is more than how high above the ground or floor?
3. Because energized electrical lines are considered u_____, workers shall not be allowed within ten feet.
4. Guys, ties, and braces shall be installed according to the manufacturer's instructions or at a __ to __ ratio.
5. A cross brace may be used as _____ a top rail __ a midrail on a fabricated frame scaffold. (both/and OR either/or)

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Fabricated Frame Scaffolds

1926.450(b)

Means a scaffold consisting of platforms supported on fabricated end frames with integral posts, horizontal bearers, and intermediate members.

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Fabricated Frame Scaffold Video

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Commitment to Safety - Scaffolding Selection and Assembly

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Fabricated Frame Scaffold

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.

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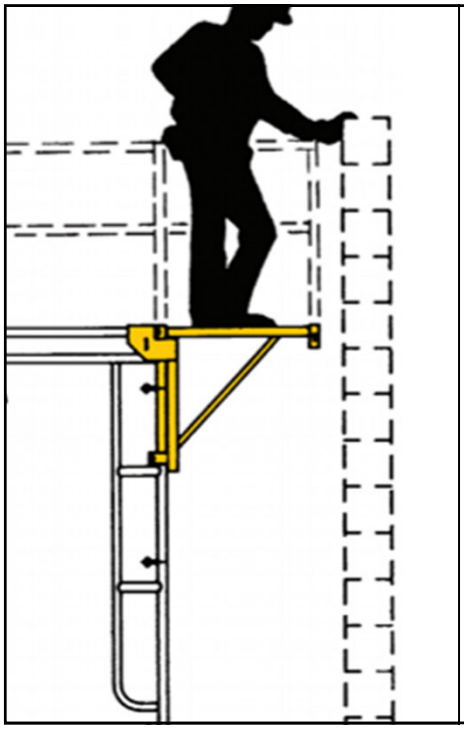

Fabricated Frame Scaffold

1926.452(c)(5) Brackets used to support cantilevered loads shall:

(i) Be seated with side-brackets parallel to the frames and end-brackets at 90 degrees to the frames.

(ii) Not be bent or twisted from these positions.

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

66

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66

Fabricated Frame Scaffold

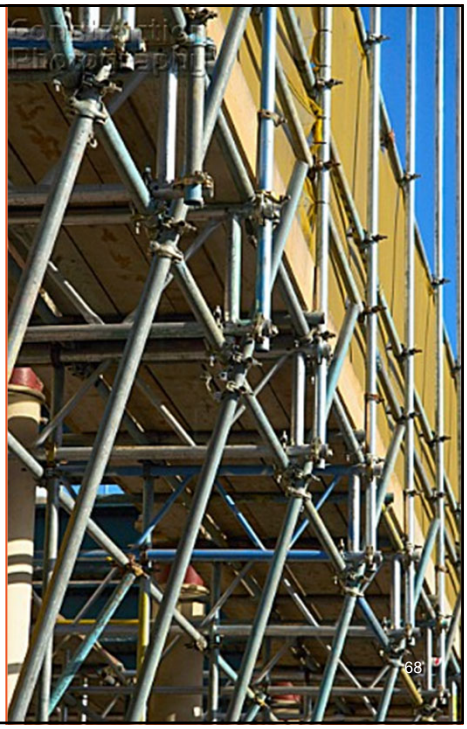
1926.452(c)(6)

Scaffolds over 125 feet 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.

67

Tube and Coupler Scaffold

1926.450(b)
Means a supported or suspended scaffold consisting of a platform(s) supported by tubing, erected with coupling devices connecting uprights, braces, bearers, and runners.



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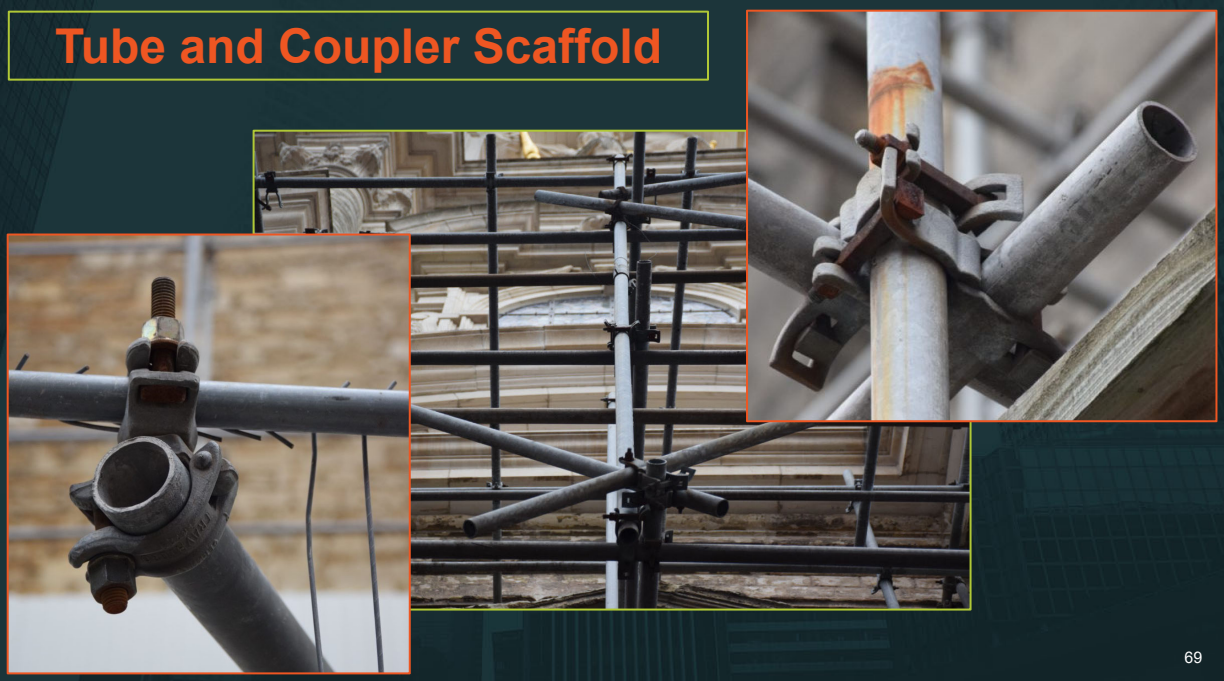
Tube and Coupler Scaffold



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Tube and Coupler Scaffold

408.41223(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.

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Tube and Coupler Scaffold

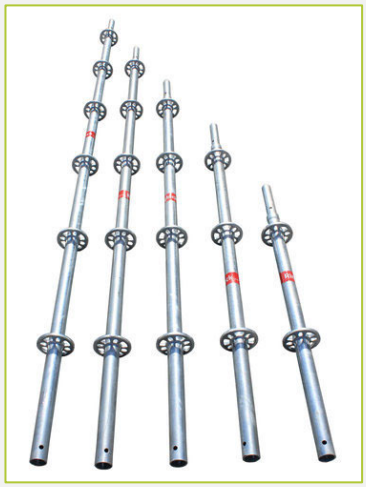
TABLE 3						
TUBE AND COUPLER SCAFFOLDS	**LIGHT DUTY**		**MEDIUM**		**HEAVY**	
Maximum uniformly distributed load	25 pounds per square foot		50 pounds per square foot		75 pounds per square foot	
Post spacing (longitudinal)	10 feet		8 feet		6 feet	
Post spacing (transverse)	6 feet		6 feet		6 feet	
Work 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

71

71

System Scaffold

1926.450(b)
Means a scaffold consisting of posts with fixed connection points that accept runners, bearers, and diagonals that can be interconnected at predetermined levels.



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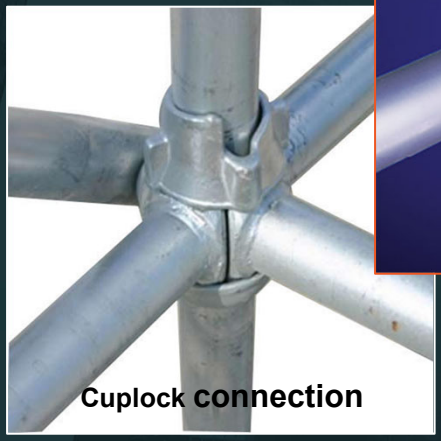
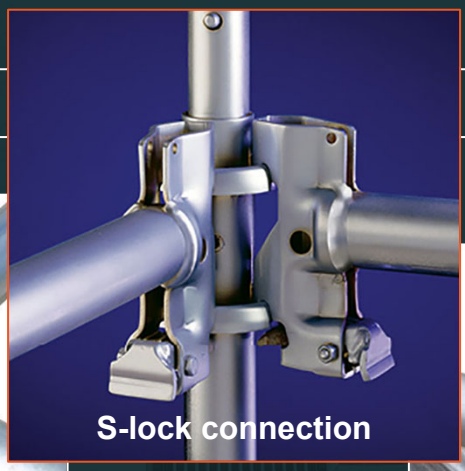
System Scaffold



Cuplock connection



S-lock connection

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Ringlock connection

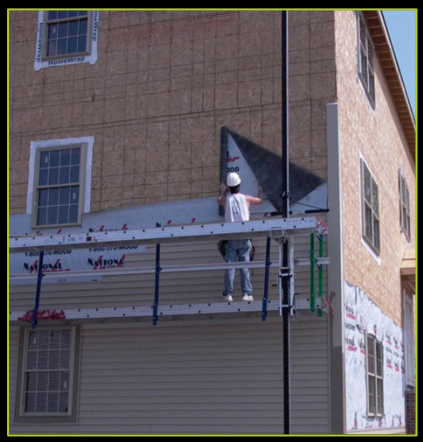
73

73

Pump Jack Scaffold

1926.450(b)

Means a supported scaffold consisting of a platform supported by vertical poles and movable support brackets.



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74

Pump Jack Scaffold

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.

75

Pump Jack Scaffold

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 four feet above the brace to be passed and shall be left in place until the pump jack has been moved and the original brace reinstalled.

76

Wood Pole Scaffold

1926.450(b)
Means a supported scaffold consisting of platforms resting on cross beams (bearers) supported by ledgers and a double row of uprights independent of support (except ties, guys, braces) from any structure.

77

Wood Pole Scaffold

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)(8)
Braces, bearers, and runners shall not be spliced between poles.

78

Stilts

1926.450(b)

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

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Stilts

408.41221(2)

Stilts shall be used only if all of these conditions exist:

(a) Floors are level.

(b) All floor holes are securely covered.

(c) When 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.

80

80

Stilts

408.41221(3)
Stilts shall not be used while going from one level to another.

408.41221(4)
An employee may wear stilts on a scaffold only if it is a large area scaffold.

81

Mast Climbing Scaffold

82

✓ Knowledge Check #4:

1) Brackets used to support cantilevered loads shall be used to support only personnel, unless what?
2) Cross braces may be removed to easier facilitate stocking a scaffold providing the competent person evaluates and approves.
   a) True b) False
3) Tube and coupler scaffolds and fabricated frame scaffolds over _____ above the base plates shall be designed by an engineer.
4) Describe how the height of stilts affects the height of guardrails.

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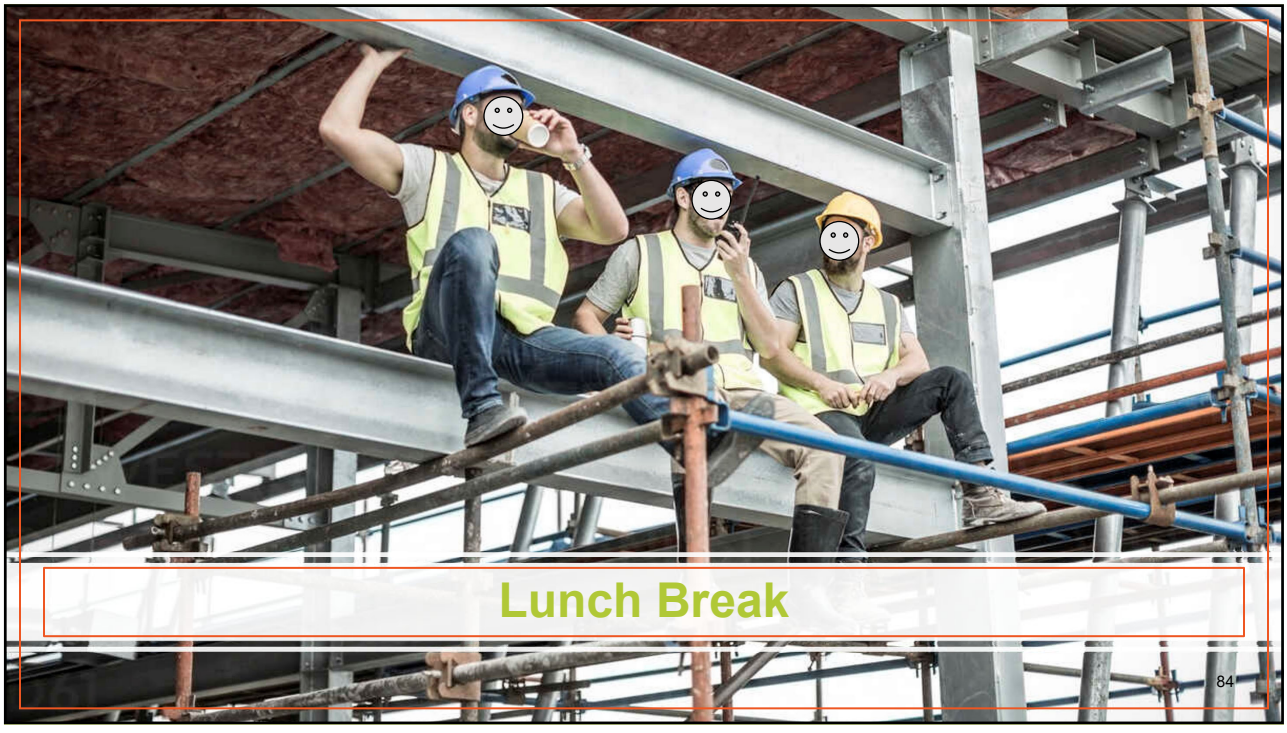

84

Mobile Scaffolds

1926.450(b)

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

85

85

Mobile Scaffold Video

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Rolling Towers Mobile Scaffold

86

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Mobile Scaffold

408.41241(1)

When a freestanding mobile scaffold is used, the height shall not be more than four times the minimum base dimension.

408.41241(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.

87

Mobile Scaffold

408.41241(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 have a locking device to prevent movement of the scaffold. The device shall be used when the scaffold is in use, except when platform is four feet or less from the floor.

88

Mobile Scaffold

408.41241(4)

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

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Mobile Scaffold

408.41241(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.

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Mobile Scaffold

408.41241(10)

An employer shall not allow an employee to ride on a mobile scaffold without all of the following conditions:

- The floor is within three degrees of level and free of pits, holes, or obstructions
- The minimum base dimension is not less than half of the height
- The casters are rubber or similar resilient tires
- All tools and materials are secured or removed before scaffold is moved
- The scaffold has guardrails on all sides

91

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Mobile Scaffold

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 five 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.

92

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93

Mobile Scaffold - Rough Terrain Forklift

408.41243(1)

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

94

Mobile Scaffold - Rough Terrain Forklift

408.41243(2)

A work platform shall be in compliance with the following requirements:

- Made of steel with four times safety factor
- Complete guardrail system – top, mid, toe
- Withstand 200 lbs. of force top and midrails
- Sign with max # of passengers, load rating, and I.D. tag
- High-visibility color or marking

95

Mobile Scaffold - Rough Terrain Forklift

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408.41243(4)

If an employee is elevated in a platform on a variable reach lift truck, a personal fall arrest system is required and shall be worn when an employee is elevated.

96

Mobile Scaffold - Rough Terrain Forklift

- 408.41243(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.

97

Mobile Scaffold - Rough Terrain Forklift

408.41243(6)

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

98

Mobile Scaffold - Rough Terrain Forklift

408.41243(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.

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Mobile Scaffold - Rough Terrain Forklift

408.41243(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.

100

Mobile Scaffold - Rough Terrain Forklift

408.41243(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.

101

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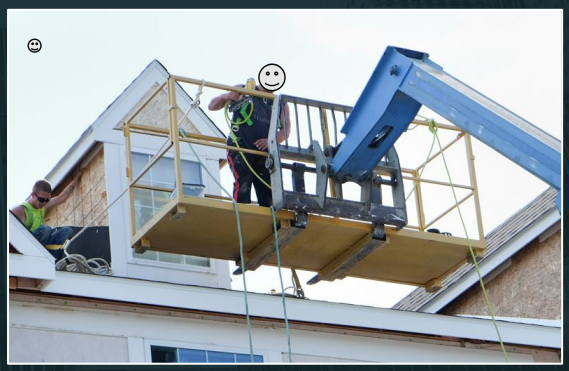
Mobile Scaffold - Rough Terrain Forklift

408.41243(10)
The guardrails of the platform shall not be used to support any of the following: materials, other work platforms, employees.



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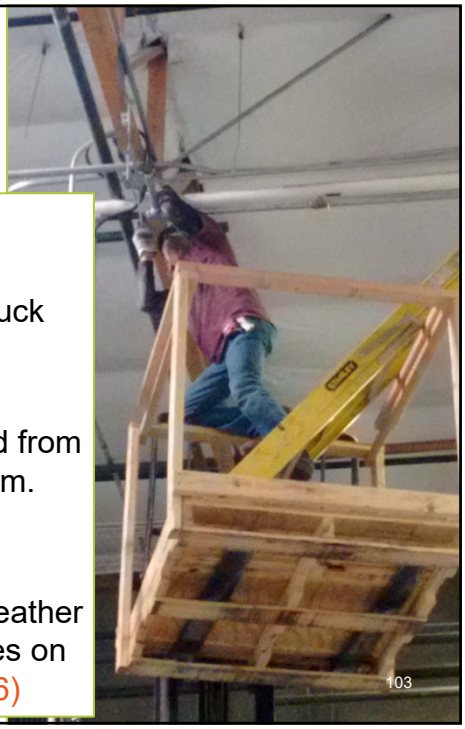
Mobile Scaffold - Rough Terrain Forklift

- A platform shall not be modified if the modification is detrimental to its safe use. 1243(12)
- A wood pallet shall not be used as a platform for lift truck scaffolds. 1243(14)
- 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. 1243(15)
- 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. 1243(16)



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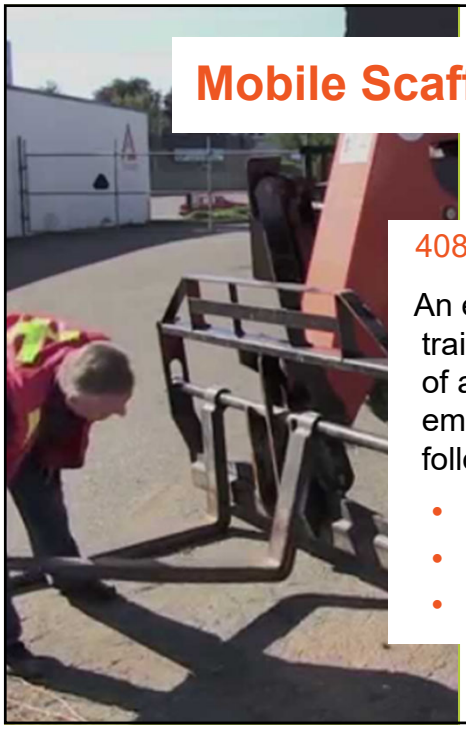

Mobile Scaffold - Rough Terrain Forklift

408.41245

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:

- The capabilities of the equipment and its attachments
- The purpose, use, and limitations of the controls
- How to make daily checks

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Knowledge Check #5:

1. Locking devices shall be used on the casters of mobile scaffolds when the platform is more than _____ high.
2. A free-standing mobile scaffold shall not be more than __ times higher than its minimum base dimension.
3. Name two specifics that a trained operator shall do while an employee is elevated on a rough terrain forklift scaffold.
4. A forklift's capacity is reduced to ___ when elevating employees.
5. Which of the following is required to reposition a lift truck platform?
   a) Return to the ground before repositioning
   b) Workers exit the landed platform
   c) Reboard only after repositioning is complete
   d) All of the above

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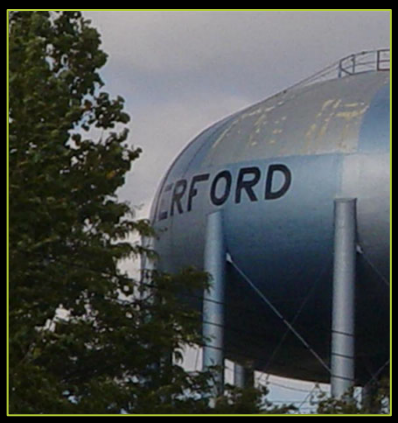

Suspended Scaffolds

1926.450(b)

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

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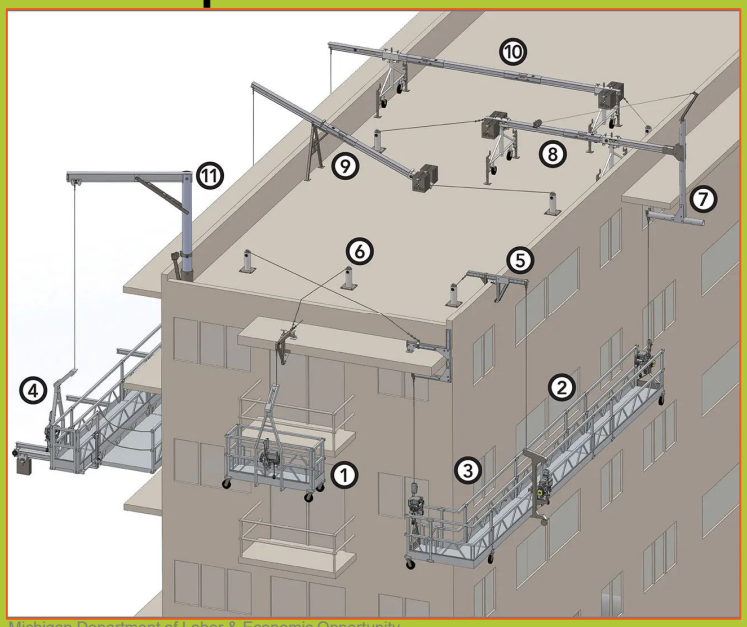
106

Suspended Scaffold



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Platforms and Rigging

1) Single-point adjustable
2) Two-point adjustable
3) Multi-point adjustable
4) Porch extension
5) Parapet clamp
6) Tieback anchor
7) Down under beam
8) Rolling outrigger beam
9) Tilt-up beam
10) Extended-reach beam
11) Davit

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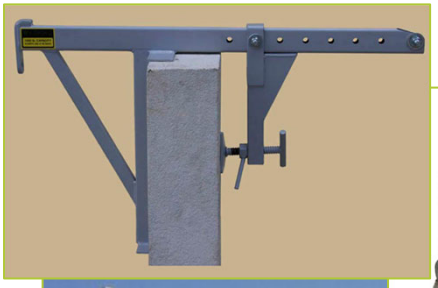
107

Suspended Scaffold

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 four times the load imposed on them by the scaffold operating at the rated load of the hoist (or at least one and a half times the load imposed on them by the scaffold at the stall capacity of the hoist, whichever is greater).



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Suspended Scaffold

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.

109

109

Suspended Scaffold

1926.451(d)(3)

The inboard end of a suspension scaffold outrigger beam shall be stabilized by bolts or other direct connection to the floor or roof deck or shall be stabilized by counterweights, except that a multipoint adjustable suspension scaffold outrigger beam shall not be stabilized by counterweights.

110

Suspended Scaffold

1926.451(d)(3)(iii)

Only 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.

111

Suspended Scaffold

1926.451(d)(3)(iv)

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

1926.451(d)(3)(vi)

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

112

1926.451(d)(3)(viii)

An outrigger beam shall be placed perpendicular to its bearing support, usually the face of the building or structure. However, if an 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, then the outrigger beam may be placed at some other angle if opposing angle tiebacks are used.

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Suspended Scaffold

113

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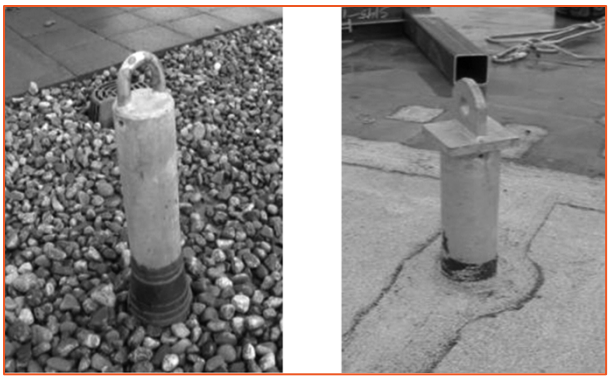
Suspended Scaffold

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 any of the following items:

- Standpipes
- Vents
- Other piping systems
- Electrical conduit



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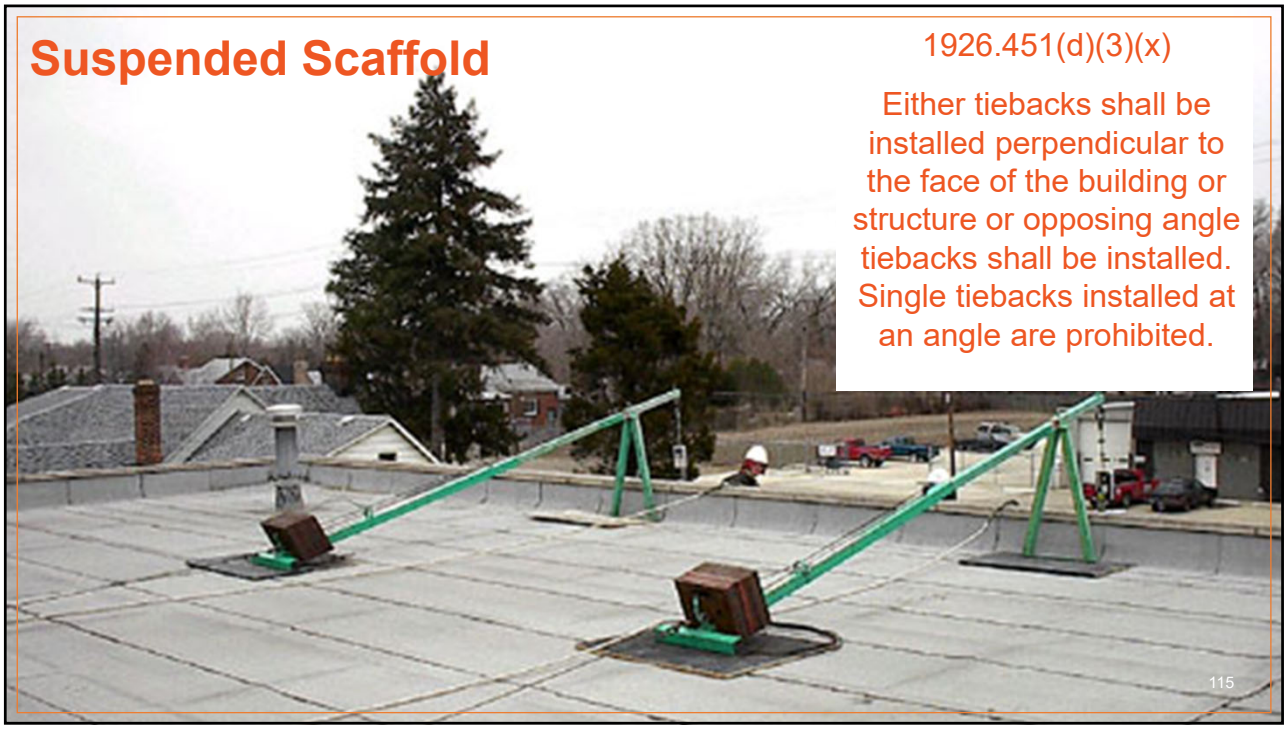
Suspended Scaffold



1926.451(d)(3)(x)

Either 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.

115

115

Suspended Scaffold

1926.451(d)(7)

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

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

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Suspended Scaffold

408.41213(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 (PFAS)
- An employee on a single-point or 2-point adjustable suspension scaffold shall be protected by both a personal fall arrest system (PFAS) and guardrail system

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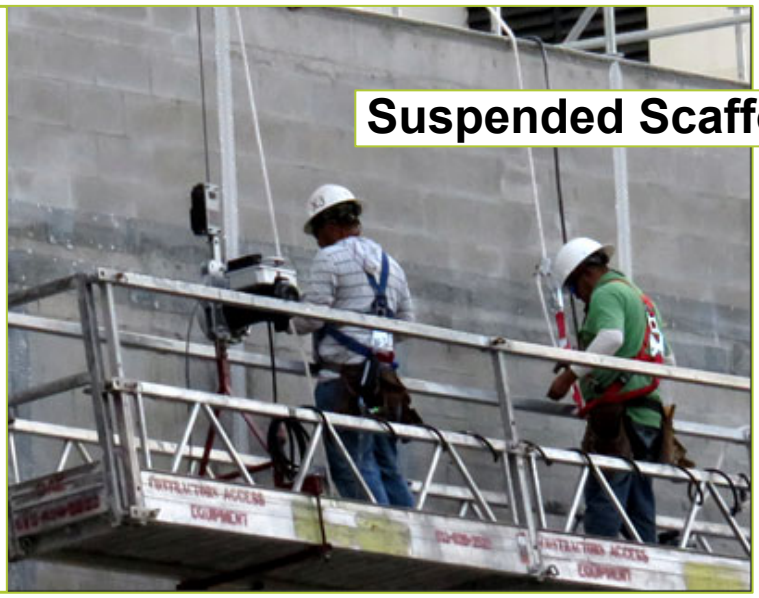
117

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.



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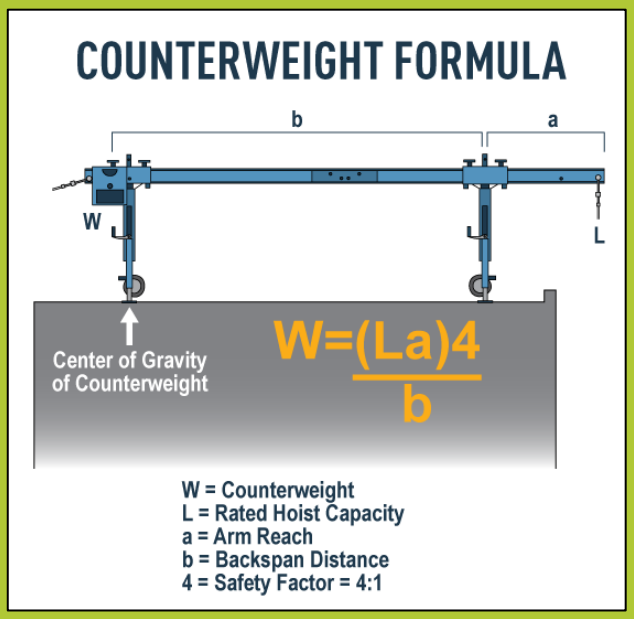

Suspended Scaffold

COUNTERWEIGHT FORMULA

$$W = \frac{(La)4}{b}$$

W = Counterweight (pounds)

L = Load (pounds)

a = Loadline to fulcrum (feet)

b = Counterweight to fulcrum (feet)

119

- Outrigger Scaffold
- Roof Bracket Scaffold
- Carpenter Bracket Scaffold
- Form Scaffold
- Ladder Jack Scaffold
- Step, Platform, Trestle Scaffold
- Window Jack Scaffold

Auxiliary Supported Scaffolds

120

Outrigger Scaffold

1926.450(b)
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.

121

121

Outrigger Scaffold

408.41251(4)
Planking shall be laid tight and shall extend to within three inches of the building wall. Planking shall be secured to the outriggers.

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Roof Bracket Scaffold

1926.450(b)
Means a rooftop supported scaffold consisting of a platform resting on angular-shaped supports.

123

123

Roof Bracket Scaffold

1926.451(b)(2)(i)
Each roof bracket scaffold platform shall be at least 12 inches wide.

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.

124

124

Carpenter Bracket Scaffold

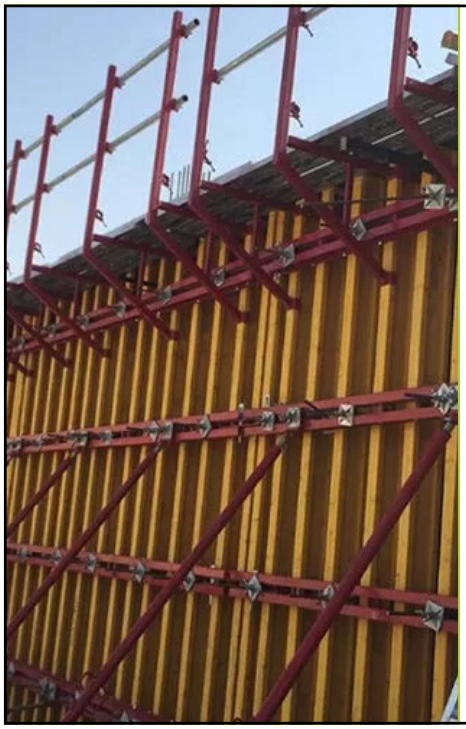
1926.450(b)
Means a supported scaffold consisting of a platform supported by brackets attached to building or structural walls.

125

Carpenter Bracket Scaffold

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. 126

126



Form Scaffold

1926.450(b)
Means a supported scaffold consisting of a platform supported by brackets attached to formwork.

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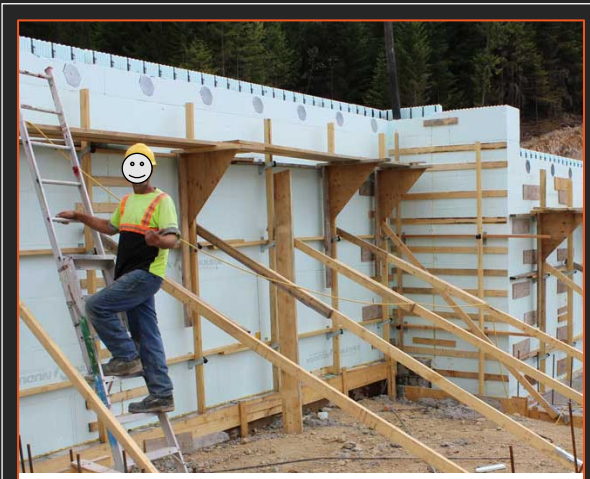


Form Scaffold

1926.452(g)(2)
Wooden bracket-form scaffolds shall be an integral part of the form panel.

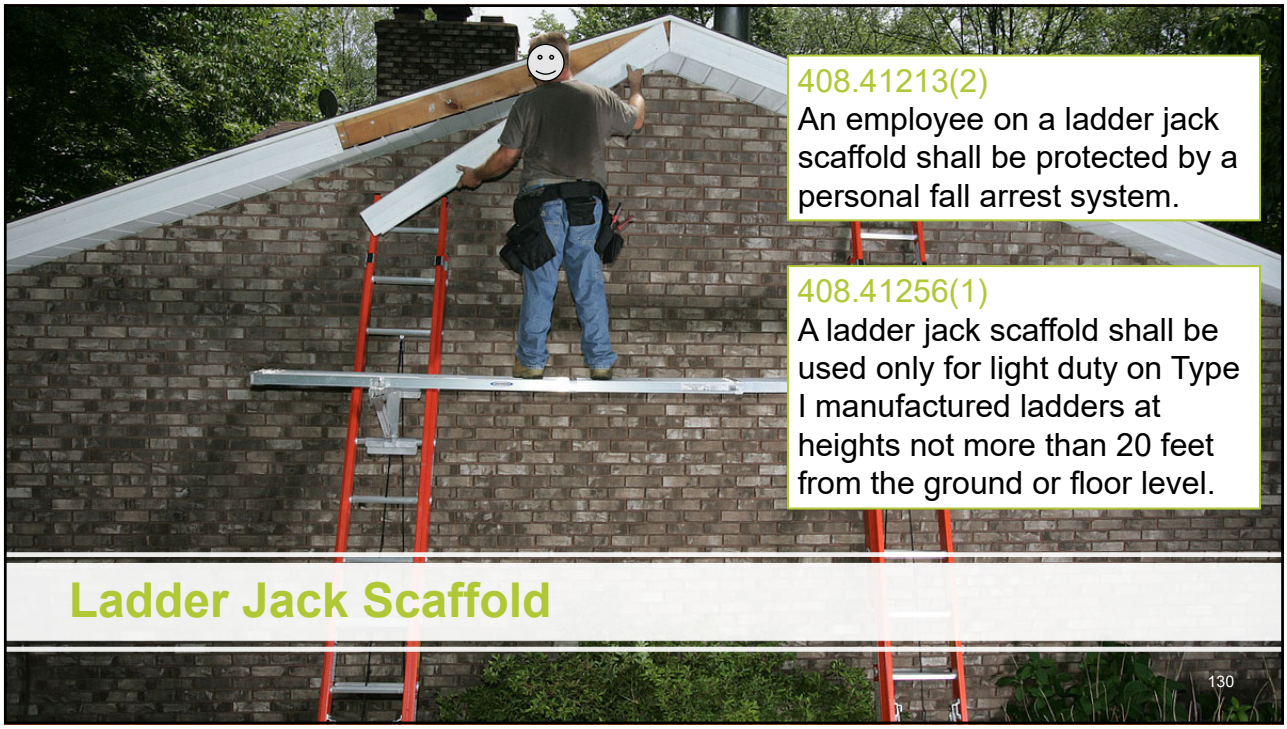
128

128

Ladder Jack Scaffold

1926.450(b)
Means a supported scaffold consisting of a platform resting on brackets attached to ladders.

129



130

Trestle Scaffold

1926.450(b) Means a platform resting directly on the rungs of step ladders or trestle ladders.

131

131

Trestle Scaffold

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)(4) Scaffolds shall not be bridged one to another.

132

132


Window Jack Scaffold
1926.450(b)
Means a platform resting on a bracket or jack which projects through a window opening.
133

133


Window Jack Scaffold
408.41264(1) A window jack scaffold shall be used as a work platform for not more than one employee and only for the purpose of working at the window opening through which the jack is placed.
134

134

Knowledge Check #6:

1. All suspension scaffold support devices, such as outrigger beams, cornice hooks, and parapet clamps shall rest on surfaces capable of supporting at least __ times the load imposed.
2. List two methods required to protect workers from falling from a swing stage (two-point adjustable suspension) scaffold.
3. Each roof bracket scaffold platform shall be at least how wide?
4. Ladder jack scaffolds require a personal fall arrest system, Type I ladders, and not to exceed a height of _____.

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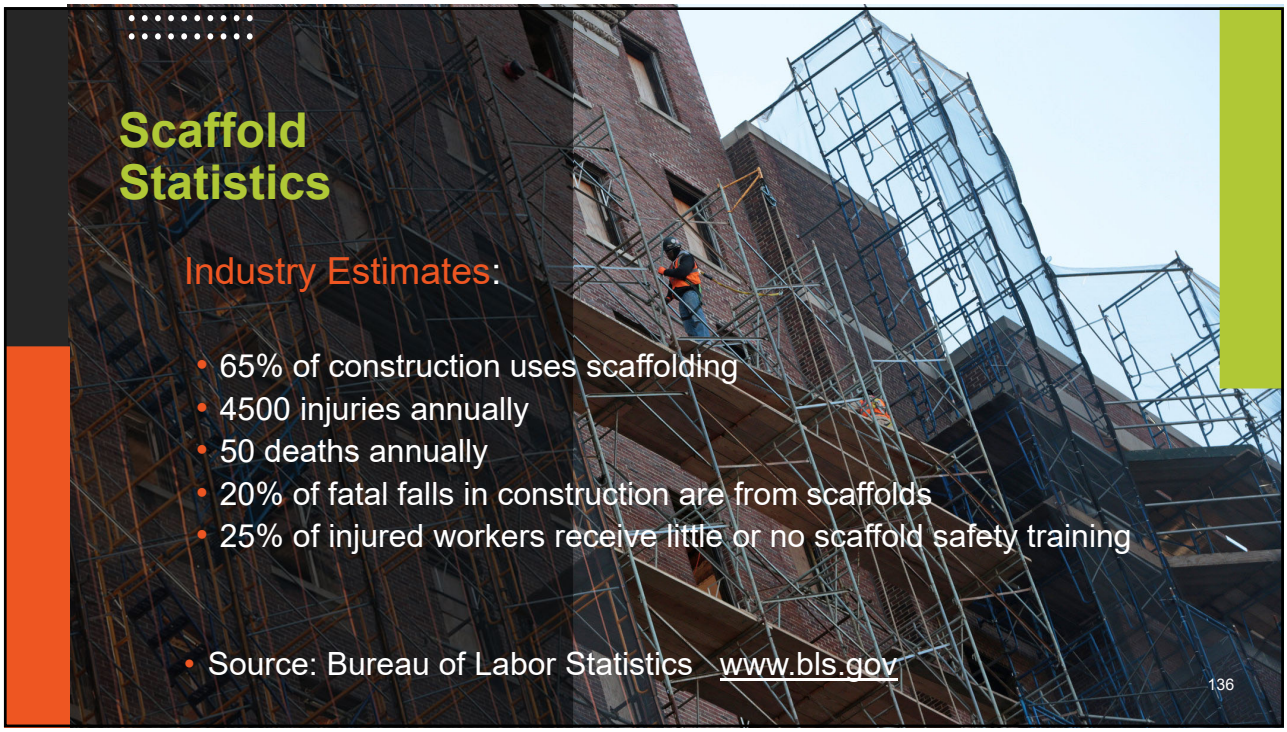

Scaffold Statistics

Industry Estimates:

- 65% of construction uses scaffolding
- 4500 injuries annually
- 50 deaths annually
- 20% of fatal falls in construction are from scaffolds
- 25% of injured workers receive little or no scaffold safety training

- Source: Bureau of Labor Statistics www.bls.gov

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Hazardous Conditions

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Hazardous Conditions

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Hazardous | Conditions

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Hazardous Conditions

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Scaffold Fatality Investigation #1 – 04/23/2016

Macomb County – Roofer, 37 years old

A Roofer jumped from a forklift scaffold to a roof, then fell approximately 30 feet to his death. The decedent was installing ice/water shield without using fall protection while boomed-up on a pallet by a forklift. The straight-mast forklift was positioned on uneven ground and began to tip over, prompting the fatal event.

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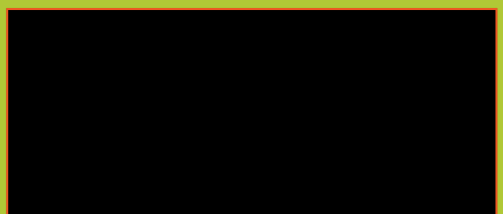
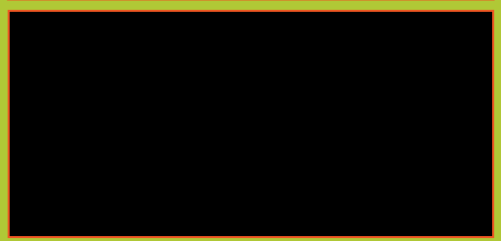


Scaffold Fatality Investigation #1 – 04/23/2016



* Similar, not actual photos

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Scaffold Fatality Investigation #1 – 04/23/2016

MIOSHA Serious Citations Issued

R408.40114(1)	Regarding an accident prevention program.
R408.41243(3)	Regarding a level forklift scaffold platform while in use.
R408.41243(4)	Regarding a fall protection system used by elevated employees.
R408.41243(5)	Regarding firm footing and outrigger deployment for forklifts.
R408.41243(14)	Regarding a wooden pallet as a platform.
R408.41245	Regarding rough terrain forklift operator training.

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Scaffold Fatality Investigation #2 – 08/16/2016

Berrien County – Electrician, 75 years old

An Electrician fell approximately 24 feet to his death from a tubular welded frame scaffold while installing an exterior light fixture on a pole barn. The decedent and another worker were accessing the fixture from ladders propped atop a two-frame high scaffold. The scaffold was not braced against the forces of the leaning ladders and tipped over resulting in the fall.

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Scaffold Fatality Investigation #2 – 08/16/2016

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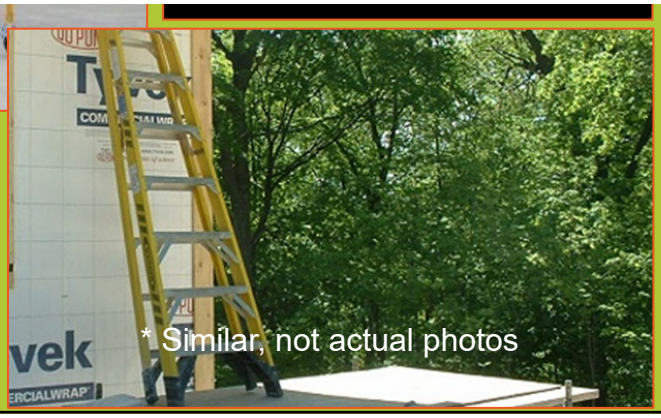

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Scaffold Fatality Investigation #2 – 08/16/2016

MIOSHA Serious Citations Issued

R408.41209(1) Regarding scaffold worker training to recognize hazards.

R408.41210(1) Regarding scaffold design by a qualified person and use as required by Part 12.

R408.41210(14) Regarding using a ladder on a scaffold for reaching higher.

R408.41213(1) Regarding guardrail installation on open sides where more than ten feet high.

R408.41241(3) Regarding locking casters of mobile scaffolds more than four feet high.

R408.41241(4) Regarding at least two horizontal diagonal braces installed on mobile scaffolds.

R408.41241(9) Regarding plumb, level, and suitable footing for mobile scaffolds.

R408.41241(11) Regarding mobile scaffold decking rules including using scaffold grade lumber, installing cleats with short plank, and fully decking platforms.

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Scaffold Fatality Investigation #3 – 11/05/2017

Washtenaw County – Carpenter, 51 years old

A Carpenter fell approximately 12 feet to his death from a roofing bracket scaffold while constructing a garage dormer. The decedent installed his own roof jacks using only two 16d nails per bracket. The scaffold dislodged from the 12/12 pitch roof resulting in the fall.

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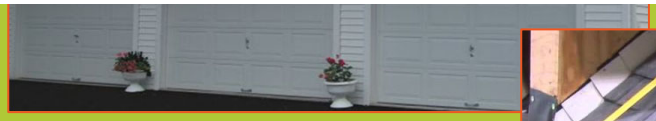
Scaffold Fatality Investigation #3 – 11/05/2017



* Similar, not actual photos

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Scaffold Fatality Investigation #3 – 11/05/2017

MIOSHA Serious Citations Issued

MIOSHA Construction Safety and Health Division did not issue citations due to lack of MIOSHA coverage of the exposed sole proprietor and automatic cessation of the business upon the owner's passing.

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Scaffold Safety in Construction

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Dos and Don'ts of Scaffold Safety

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Scaffold Best Practices

- Consult operator's manual
- Use manufacturer's website
- Require fall protection
- Verify and document training for employees
- Refresher training for employees
- Perform pre-task analysis
- Use near misses as training tool
- Use inspection tags
- Use checklists

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Scaffold Course Summary

Train employees by a Qualified Person

Designate employee on site as the Competent Person

Inspect scaffolding before each shift

Follow manufacturer's instructions

Assure proper access and stable base

Use fall protection

Protect from falling objects

Comply with all MIOSHA Standards

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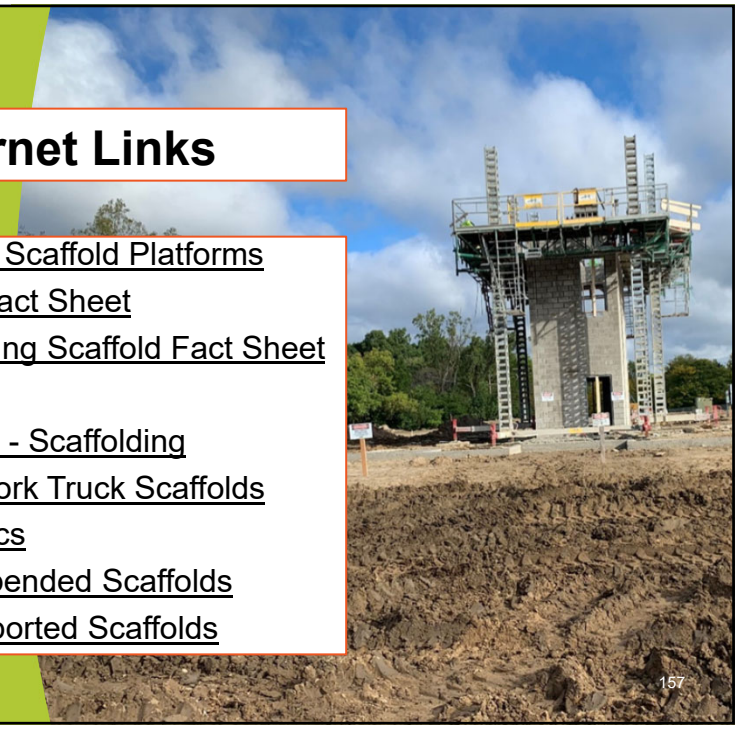
Scaffolding Internet Links

- MIOSHA Part 12, Scaffolds and Scaffold Platforms
- MIOSHA Suspended Scaffold Fact Sheet
- MIOSHA Erecting and Dismantling Scaffold Fact Sheet
- OSHA Scaffolding eTool
- OSHA Safety and Health Topics - Scaffolding
- Tool Box Talk - Rough Terrain Fork Truck Scaffolds
- Tool Box Talk - Scaffolding Basics
- Code of Safe Practices for Suspended Scaffolds
- Code of Safe Practices for Supported Scaffolds



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Scaffold Assessment

- The purpose of this assessment is to validate the knowledge learned in class
- Passing score of 70% is required
- Class reference materials/books are not allowed to be used during the assessment
- Collaboration/discussion with others is not allowed during the assessment
- Answers will be reviewed after everyone completes and submits their assessment

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Thank You For Attending This Presentation

Don't Forget to Take the Survey

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Part 12. Scaffolds and Scaffold Platforms

Student Resources

MIOSHA Standards:
Part 12. Scaffolds and Scaffold Platforms

MIOSHA Fact Sheets:
Decking Used as a Work Platforms During Bridgework

Erecting and Dismantling Scaffolds - Is Fall Protection Required?

Scaffold Weather Protection Wind Load Factors

Suspended Scaffold Safety

Other Resources:
Scaffolding, Shoring and Forming Institute

Scaffold and Access Industry Association

OSHA Scaffolding eTool

Occupational Safety and Health Administration (OSHA)

MIOSHA Training Institute (MTI) Resources:
www.michigan.gov/mti

MIOSHA Training Calendar:
www.michigan.gov/mioshatraining

MIOSHA Homepage:
www.michigan.gov/miosha

Michigan Department of Labor and Economic Opportunity
Michigan Occupational Safety and Health Administration
Consultation Education and Training Division
525 W Allegan St, PO Box 30643
Lansing, Michigan 48909-8143

For more information or to request consultation, education, and training services
call 517-284-7720
or
visit our website at www.michigan.gov/miosha

www.michigan.gov/leo