

Introduction

- Scaffold User Training
- Welcome!
- The purpose of this Click Safety course is to provide instruction for basic safety provisions when using scaffolds in construction activities.
 - Estimated length: 30 minutes
 - Audience: construction workers

Introduction

- Course Objectives
- Upon completion of this course, you should be familiar with basic scaffold user safety, including:
 - Various hazards related to the use of scaffolds
 - OSHA standards regarding:
 - Materials and equipment
 - Proper setup and use
 - Competent person inspection
 - Supported and rolling scaffolds

Introduction

- Learning Objectives
- Upon completion of this training session, the student will be able to:
 - 1: Identify major scaffold hazards
 - 2: Describe types of scaffold hazards
 - 3: Protect him/herself from scaffold hazards
 - 4: Recognize employer requirements to protect workers from scaffold hazards

TIP: Disclaimer: This Compliance Assistance product is not a standard or regulation, and it creates no new legal obligations. The Compliance Assistance product is advisory in nature, informational in content, and is intended to assist employers in providing a safe and healthful workplace. Pursuant to the Occupational Safety and Health Act, employers must comply with safety and health standards promulgated by OSHA or by a State with an OSHA-approved State Plan. In addition, pursuant to Section 5(a)(1), the General Duty Clause of the Act, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm. Employers can be cited for violating the General Duty Clause if there is a recognized hazard and they do not take reasonable steps to prevent or to abate the hazard. However, failure to implement these recommendations is not, in itself, a violation of the General Duty Clause. Citations can only be based on standards, regulations, and the General Duty Clause.

Introduction

- Course Overview
- Scaffold design and use:
 - The value of a safe scaffold
 - Common types of supported scaffolds
 - Standards common to most supported scaffolds
 - Scaffold plank selection and inspection standards
 - Fully planked scaffold platforms

Introduction

- Course Overview
- Scaffold erection requirements:
 - Who erects scaffolds?
 - How are they built?
 - Need and method for securing taller scaffolds
 - Requirements for access

Safety Tip: Never climb scaffold cross braces or guardrails to get to levels of the scaffold.

Introduction

- Course Overview
- Light, medium, and heavy trade scaffolds:
 - Definitions
 - Load capacities

Safety Tip: All scaffolds, whether supported or rolling, must be built plumb, level, and square.

Introduction

- Course Overview
- Hazards associated with using scaffolds:
 - Electrical, falling, falling objects, loading
 - Protection:
 - OSHA regulations
 - Daily inspection
 - Reporting

Safety Tip: Never remove scaffold components without permission. If components are removed, replace them immediately when you've finished your task.

Introduction

- Course Overview
- Other general regulatory requirements, e.g.:
 - No work on scaffolds with snow or ice
- Requirements specific to rolling scaffolds, e.g.:
 - Erection, use

General Safety

- Statistics
- Poor scaffolds lead to accidents and injuries.
 - 17% of fall fatalities are from scaffolds.
 - Avoid the following unsafe practices:
 - Lean-to scaffolds
 - Stacking materials too high
 - Using poor quality lumber or plywood

General Safety

- Types of Scaffolds
- Tubular welded frame:
 - Most common, used by many trades
- Tube and clamp / system scaffolds:
 - Built around piping systems, often in power plants
- Metal A-frame horse scaffolds:
 - Useful for both exteriors and interiors of buildings
- Rolling scaffolds:
 - Provide easy access for many work activities

General Safety

- Design
- Scaffolds are designed to perform work at heights.
 - Should never be built haphazardly;
 - Rather, should always be erected:
 - Plumb
 - Level
 - Square
 - Secure

Safety Tip: Never climb on an improperly built scaffold..

General Safety

- Erection
- Scaffolds must be erected with:
 - Fully planked platforms (no holes or gaps)
 - Specially designed, scaffold-grade planks
 - Base plates or sills under each leg
 - Feet (minimum of 4" x 4") or adjustable jacks
 - Proper access, e.g., ladders
 - Guardrails, midrails, and toe boards as needed

General Safety

- Competent Person
- Scaffolds must be erected, moved, and dismantled by a trained crew under supervision of a designated:
 - Competent person: one who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them.

Safety Tip: Scaffolds must also be inspected before each shift by a competent person.

General Safety

- Qualified Person
- When supported metal scaffolds are built higher than 125', or the design is unusual, the design and erection must be approved by a designated:
 - Qualified person: a person designated by the employer who, by reason of training; experience; or instruction, has demonstrated the ability to safely perform assigned duties and, when required, is properly licensed in accordance with federal; state; or local laws and regulations.

Hazards

- OSHA Requirements
- Scaffold users must be properly trained in:
 - Electrical exposures
 - Fall protection
 - Falling object protection
 - Load capacities

Hazards

- Electrical Hazards
- If power lines cannot be deenergized (ideal), the worker and scaffold must be separated by at least:
 - 3' if lines are insulated and < 300 volts
 - 10' if lines are uninsulated or ≥ 300 volts
- When distances cannot be maintained, isolating barriers or mats must be installed.

Hazards

- Fall Hazards
- Scaffold platforms > 10 feet require fall protection.
- If guardrails cannot be used:
 - Fall arrest must be provided, including:
 - Anchorages (able to support 5000 pounds)
 - Full body harness and shock absorbing lanyards
 - Make sure you know where to tie off and how.
 - If you are unsure, check with your supervisor.

Safety Tip: Some state plan's rules, like California's, are more restrictive. When you will work on a scaffold, make sure you know exactly what fall protection requirements will be required.

Is This a Fall Hazard?



YES

Workers could fall while climbing on the shoring structure to set it up and remove it.

Ladders and lifts must be provided.



Hazards

- Falling Object Hazards
- Tools and materials can easily fall from a scaffold to injure someone below;
 - Toe boards are generally required.
 - Over the front and rear face of the scaffold
 - All levels over entries or access points
 - Nominal dimension if materials piled > 4 inches

Safety Tip: Do not remove toe boards or screening unless others are warned of the new hazard you are creating. If you have removed toe boards or screening, replace it as soon as the work requiring removal is completed.

Preparing for Scaffold Erection

Load Capacities and Frame Spacing

- Light Trade: 10-foot frame space, 25 psf
- Medium Trade: 8-foot frame space, 50 psf
- Heavy Trade: 6-foot frame space, 75 psf

1. Ground: Note that it is level and firmly compacted. 2. Scaffold base: Note the scaffold frames are well supported. 3. Scaffold base: Note no holes or obstructions that impact proper load bearing on the soil; 4. Frame: Note spacing is 6 feet heavy duty scaffold for block construction.

Load Capacity

- Frames
- If bearers are closer, planks can carry greater loads.
 - Load rating can be determined by the spacing:
 - Light trade: 10 feet apart
 - Medium trade: 8 feet apart
 - Heavy trade: 7 feet apart

Safety Tip: Scaffold frames must never be spaced wider than 10 feet apart. If you see such a situation, do not get on that scaffold.

Load Capacity

- Load Rating
- Calculate load capacity for a 5-foot-wide scaffold:

Light trade scaffold (10 feet between bearers):

5 feet x 10 feet = 50 square feet

Light duty rating = 25 pounds per square foot

25 psf X 50 sf = 1250 pounds

Heavy duty scaffold (7 feet between bearers):

5 feet x 7 feet = 35 square feet

Heavy duty rating = 75 pounds per square foot

75 psf X 35 sf = 2625 pounds

Load Capacity

- Stability
- Scaffold legs carry loads:
 - Of people, planking, frames, and equipment
 - From platform heights to the ground
 - Weighing between 2000 and 3000 pounds
- Plates or sills must:
 - Include no unstable materials
 - Bear fully and evenly on the ground
 - Follow manufacturer's requirements

Access

- Safe Access
- There are many ways to get on a scaffold, including:
 - Ladders
 - Attachable stairs
 - Ramps from an upper level
 - Climb from inside a structure

Safety Tip: Scaffold cross braces, rails, or other elements of the scaffold are not designed to accept climbing loads. They can also be slippery and you can lose your grip. Never climb cross braces to gain access to a scaffold.

Access

- Climbing
- Never climb frames unless they are designed for it.
 - Sufficient space for your feet
 - Wide enough to be climbed comfortably
 - Evenly spaced
- Never jump onto scaffold platforms

Special note: This was a scaffold erection class and demonstration with hands on elements. Please note that the observers not involved in the hands-on were not required to wear PPE, only those directly involved in the erection and dismantling.

Erection Standards

- Erection Criteria
- At least 10" square base plates
 - 2" lumber or 1 1/8" plywood
- 4" square foot nailed to the base plate
 - On soil or asphalt, use feet and pads or full sills between frames; on concrete, pads not required
- Screw jack that slides into the scaffold frame leg
 - Not to be extended more than 2/3 of full extension

Erection Standards

- Tubular Welded Frame Scaffolds
- Standard frames, fixed width and height
- Equipment should all be of the same:
 - Manufacturer
 - Metal makeup
- Each frame has locking studs welded onto it that:
 - Accept cross braces for installation
 - Should function properly
 - Do not replace with wire

Safety Tip: Scaffold types such as tube and coupler and system scaffolds are made of steel or aluminum; steel elements should never be intermixed with aluminum elements.

Erection Standards

- Tubular Welded Frame Scaffolds (cont.)
- Held together with cross braces
- Length of cross brace determines frame spacing
 - Maximum = 10 feet (light trade)
 - Minimum = 7 feet (heavy trade)
- Cross braces must be:
 - Undamaged
 - Secured properly on welded studs of frames

Safety tip: System and tube and clamp scaffolds require cross braces in all directions for proper support.

Erection Standards

- Connection Pins
- Properly built scaffolds should:
 - Carry loads directly to the ground.
 - Distribute appropriately to the supporting soil.
 - Remain fairly stable without special connections;
 - However, in some conditions (e.g., wind, ladders on the outside frame), connection pins can secure and stabilize tubular welded frame scaffolds.

Safety Tip 1: System and tube and clamp scaffolds have solid connections or pre-assembled connections at all points of frame support.

Safety Tip 2: standard grade bolts or nails cannot take the shear loading that can occur at these connections.

Erection Standards

- Guardrails / Toe boards
- Requirements:
 - Minimum height (if made after 2000): 39 inches
 - Maximum height (normally): 45 inches
 - Midrails halfway between top rail and platform
 - Cross braces may serve as top or midrails
 - Toe boards (if necessary):
 - At least 4" nominal
 - Protect the entire edge

Erection Standards

- Securing to Structures
- Requirements for securing a scaffold include:
 - When scaffold reaches 4 times its narrowest base dimension (e.g., 20 feet for a 5-foot-wide scaffold): secure and brace away from structure.
 - Scaffolds less than 3 feet wide: secure every 30 feet horizontally and every 20 feet vertically
 - Scaffolds wider than 3 feet: secure every 30 feet horizontally and every 26 feet vertically.

Safety Tip 1: Installation of ties and braces must be done in a workmanlike manner. Don't get sloppy and risk a failure.

Safety Tip 2: Some states, such as California at 3:1, have different required ratios of height to base dimension for the securing of scaffolds. Be sure to check.

Erection Standards

- Securing to Structures (cont.)
- Other methods of security include:
 - Bolts and threaded connections and 9-gauge wire;
 - However, scaffold must be tied to and braced away from the structure to assure the scaffold is stable for work.

Recognize Any Hazard(s)?



Yes



Scaffold was erected 4 ½ feet from 7.2 kV power lines

Planking

- Fully Planked Platforms
- Fully planked means:
 - Scaffold frame is covered from front to back
 - No more than 1” spacing between planks
 - No more than 10” space from backside of frame
 - Must bear on supports at least 6”
 - Cleat if planks move or cannot make minimum
 - For continuous runs, planks must overlap 12”

Safety Tip: Unless it is designed and installed to support employees and materials without tipping, or has guardrails that block employee access, each end of a platform may not extend over its support more than 12 inches (for platforms 10 feet or shorter in length) or more than 18 inches (for platforms more than 10 feet long).

Planking

- Wood Planks
- Planks must be able to support significant loads on the weakest dimension for load bearing.
 - Scaffold grade with straight grain and no knots
 - Inspected for quality before installation
 - 4:1 safety factor means that the load rating for the plank is $\frac{1}{4}$ of the break strength of the plank.

Safety Tip: report damaged planks so they can be removed and replaced.

Planking

- Grading Scaffold Planks
- Identifying scaffold-grade materials:
 - Scaffold Industry Association (SIA) has a manual.
 - Planks should be straight grained without knots.
 - Southern Pine or Douglas Fir are common.
 - Check for defects.
 - Standard lumber should not be used.

Planking

- Other Types of Planks
- Some manufacturers have combined lightweight aluminum frames with plywood platforms.
 - Secured with hooks
 - Fit specific types and lengths of scaffolds
- Newer planks are made of laminated veneer lumber
 - Much like manufactured “glu-lam” beams
 - Stronger than naturally selected materials
 - No lumber grading, but marked for compliance

Planking

- Removing Planks from Service
- Indications of deteriorating quality include:
 - Deep checking
 - Full penetration cracks
 - Significant warping
 - Chemical damage
 - Saw cuts
 - Extreme deflection under load

Safety Tip: The SIA manual also provides criteria for removing planks from service.

Supported Scaffolds

- Spacing from Building or Wall
- For most trade work, a distance of 14" is allowed from the front face of the scaffold frame to the face of the finished building (unless guardrails on the interior face are provided).
- Plastering operations allow a distance of 18".
- Work from outrigger bracket sections allows only 3".

Supported Scaffolds

- Extensions
- When working on a scaffold, there are times when you can't reach some areas of work.
 - Do NOT use a ladder on top of a scaffold.
 - As tempting as it might be!

Supported Scaffolds

- Inclement Weather
- Discontinue scaffold work:
 - During stormy or high wind conditions
 - If the scaffold is covered with ice or snow

Is this a Fall Hazard?



YES

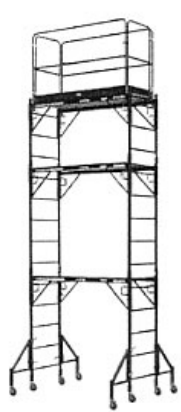
Lack of fall protection for workers on fabricated frame scaffolds.

Planks appear to be overloaded and there is no safe access for workers.



The workers are exposed to a 35-foot fall hazard from a scaffold while stacking blocks prior to overhand bricklaying operations.

Rolling Scaffolds



MF431

- Standards of Erection
- Rolling scaffolds can be made using tubular welded frames or tube and coupler or system components;
 - Or manufactured specifically as a rolling scaffold.
- The scaffold sits on wheels.
 - Must be plumb, level, and square
 - Base-to-height ratio cannot exceed 4 times the narrowest dimension
 - Some states, e.g., CA, are more restrictive.

Rolling Scaffolds

- Standards of Erection (cont.)
- Rolling scaffolds must be built to prevent racking.
 - Horizontal diagonal braces between frames
- Like supported scaffolds, rolling scaffolds require:
 - Fully planked platforms
 - Guardrails
 - Midrails
 - Toe boards

Rolling Scaffolds

- Safe Use
- Safe use of rolling scaffolds requires:
 - Level surfaces (within 3 degrees)
 - Balanced loads
 - No obstructions or holes
 - No extensions (e.g., ladders, barrels, or boxes)
 - Never stand on scaffold rails.
 - Wheels locked during work
 - No self-propelling or surfing

Safety Tip: California does allow some limited surfing. Check state standards.

Rolling Scaffolds

- Moving a Rolling Scaffold
- Self-propelling is not allowed;
- However, OK to be pushed with specific controls:
 - 2:1 base-to-height ratio
 - Rider must hold on while moving
 - Pusher pushes (not pulls) at a height of ~ 5 feet
 - Floor within 3 degrees of level
 - Floor must be free of holes, pits, and obstructions

Rolling Scaffolds

- Access
- As with supported scaffolds, there are many ways to get onto a rolling scaffold:
 - External ladders
 - Internal stairs
 - Internal ladders
 - Other stable options

Rolling Scaffolds

- Inspection
- Rolling scaffolds must be inspected:
 - Daily before use
 - By a competent person

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

Conclusion

- Summary
- We have covered:
 - Various hazards related to the use of scaffolds
 - OSHA standards regarding:
 - Materials and equipment
 - Proper setup and use
 - Competent person inspection
 - Supported and rolling scaffolds

Conclusion

- Summary
- Also covered:
- Scaffold design and use:
 - The value of a safe scaffold
 - Common types of supported scaffolds
 - Standards common to most supported scaffolds
 - Scaffold plank selection and inspection standards
 - Fully planked scaffold platforms

Conclusion

- Conclusion
- Also covered:
- Scaffold erection requirements:
 - Who erects scaffolds?
 - How are they built?
 - Need and method for securing taller scaffolds
 - Requirements for access