Scaffolding Safety
1926.450 - Scope, Application

- Covers all scaffolds used in workplaces
- Does not apply to crane or derrick suspended personnel platforms, which are covered by 1926.550(g)
- Aerial lifts are covered exclusively by 1926.453
1926.450 – Purpose

• Updates existing standard to include types of scaffolds such as catenary and step trestle
• Allows flexibility in the use of fall protection systems to protect employees
• Simplifies language, eliminates duplicative outdated provisions, consolidates overlapping requirements
• Allows employers compliance flexibility
Organization of Standard

• 1926.450 Scope, application and definitions applicable to this subpart
• 1926.451 General requirements
• 1926.452 Additional requirements applicable to specific types of scaffolds
• 1926.453 Aerial lifts
• 1926.454 Training
Organization of Standard (cont’d)

• Appendix A – Scaffold specification
• Appendix B – (Reserved) Criteria for determining the feasibility of providing safe access and fall protection for scaffold erectors and dismantlers
• Appendix C – List of National Consensus Standards
• Appendix D – List of Training Tropics for Scaffold Erectors and Dismantlers
• Appendix E – Drawing and Illustrations
1926.450 – Effective Dates

• Effective on November 29, 1996, except for 1926.453(a)(2)

• Paragraphs (e)(9) and (g)(2) for 1926.451 which address safe access and fall protection for employees erecting and dismantling supported scaffolds is effective September 2, 1997
1926.450 – Major Points

• 10 foot trigger height for fall protection on scaffolds

• 36 inch minimum guardrail height where fall arrest systems are primary fall protection

• 38 inch minimum guardrail height where guardrail is primary fall protection

• Provides for use of cross-bracing as guardrail under certain conditions, in lieu of either a mid-rail or a top-rail

• Requires after 1 year, that competent person determines feasibility of providing fall protection for built-up scaffold erectors and dismantlers
Scaffold Definition

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

• Inspect scaffolding and components prior to each work shift
• Determine feasibility of providing fall protection and access
• Evaluate connections to support load and prevent swaying
• Determine structural soundness when intermixing components manufacturer
• Train erectors and dismantlers to recognize work hazards
1926.451(a) Capacity

- Non-Adjustable
  - Support its own weight and 4 x maximum intended load
  - Suspension rope and connecting hardware support 6 x maximum intended load
- Adjustable
  - Stall load of scaffold hoist not to exceed 3 x rated load
  - Designed by a qualified person and built to loaded design
1926.451(b) Platform construction

- Fully planked and decked
  - No more than 1” gap between adjacent units and platform and uprights
  - Max openings between platform and uprights 9 1/2”
  - Platform and walkways at least 18” wide
1926.451(b) Platform construction (cont’d)

- Each abutted end shall rest on a separate support surface
- Overlap platforms not be less than 12” only over supports unless restrained to prevent movement
- On direction changes, platforms that rests on a bearer at an angle other than a right angle must be laid first
- Platforms that rest at right angles over the same bearer laid second
1926.451(b) Platform construction (cont’d)

• Front edge of all platforms
  – No more than 14” from face of work
  – 3” from face for outrigger scaffolds
  – 18” from face for plastering and lathing operations

• Platforms 10’ and less to extend at least 6” but not more than 12” past support

• Platforms greater than 10’ nor more than 18” past support unless
• Fully planked and decked
  – Ladder jack, top plate bracket, roof bracket, and pump jack scaffold at least 12” wide
  – Guardrails and/or personal fall arrest systems for platforms and runways not 18’ wide
1926.451(b) Platform construction (cont’d)

- No paint on wood platforms, except edges that may be marked for identification
- Fully planked between from upright and guardrail
- No mixed components, unless compatible and integrity maintained
- No modification of mixed components unless approved by competent person
- No components or dissimilar metals unless competent person determines galvanic action will not reduce strength
1926.451(c) Supported scaffolds

- Restrained from tipping by guys, ties, or equivalent when higher than 4:1 ratio
- Support installed per recommendations or at closest horizontal member to the 4:1 height
1926.451(c) Supported scaffolds (cont’d)

- Never use scaffolds that do not have proper guardrails installed
1926.451(c) Supported scaffolds (cont’d)

• Scaffold platforms must be fully planked
1926.451(c) Supported scaffolds (cont’d)

- Must bear on adequate foundations
- Unstable objects will not be used as working platforms
- Plumbed and braced
1926.451(d) Suspension scaffolds

- Support devices must support 4 x imposed load
- Outrigger beams, metal or equivalent material, and restrained
- Outrigger beams stabilized to floor or roof deck
- Direct connection evaluated by competent person
1926.451(d) Suspension scaffolds (cont’d)

- Counterweights made of non-flowable material, sand, gravel, etc.
- Counterweights secured, and not removed until scaffold disassembled
- Tiebacks secured to sound anchorage on the building or structure
- Single tiebacks installed at angle prohibited
1926.451(d) Suspension scaffolds (cont’d)

- Minimum lengths for suspension ropes on hoists
- No repaired wire rope
- Proper sized eye splice thimbles
- Ropes inspected by competent person
- No swaged attachment unless approved
1926.451(d) Suspension scaffolds (cont’d)

- No gasoline powered equipment or hoist
- Automatic brakes on powered and manual hoists
- Positive crank force to descend
- Tied to prevent swaying
- Safety devices not used as platforms
1926.451(e) Access

- Must have safe access
- Cross-braces prohibited as means of access
- Bottom rung no more than 24’ high
- Rest platforms required at 35’ intervals
- Slip-resistant treads on all steps and landings
- September 2, 1997, sets access for erectors and dismantlers
- Can use end frames for access
1926.451(e) Access (cont’d)

• Hook-on attachable ladders
  – Specifically designed for type of scaffold
  – Lowest rung no more than 24 inches above level on which scaffold is supported
  – Rest platforms at 35 foot intervals when more than 35 feet high
  – Minimum rung length 11 ½ inches, and a maximum space between rungs 16 ¾ inches
1926.451(f) Use

- Never overloaded
- Erected, moved, dismantled and altered near power lines
- Repair in place or replace damaged components
- Restrict horizontal movement with employees unless designed by registered P.E.
- Prohibit work activities during high winds unless authorized by C.P.
- Remove whole scaffold from service until repaired
1926.451(f) Use (cont’d)

Proper clearance near overhead lines

Keep 10 foot minimum unless de-energized, Relocated, or installed protective covering installed!
1926.451(f) Use (cont’d)

- No work on snow, or ice covered platforms
- No barrels, boxes or ladders on top of scaffolds
1926.451(g) Fall protection (PFAS or Guardrails)

- Required at 10’
- May be used in lieu of guardrails on some scaffolds
- PFAS and guardrails on suspension scaffolds
- Required for erectors and dismantlers after September 2, 1997 if feasible and no greater hazard
- Top-rails after 1-1-2000, 38” to 45” high
- In some cases, may use cross bracing in lieu of top-rail or mid-rail
1926.451(h) Falling object protection

- Hardhats required for employee
- Protect employees below from falling objects
  - Toe-boards
  - Canopies
  - Barricades
29 CFR 1926.452 - Supported scaffolds

- Supported scaffolds consist of one or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support
Pole

- Restrict movement of existing platform until bearers are set, and braced
- Couplers have to be made of structural steel
- The use of couplers made from gray cast iron is prohibited
- Designed by P.E. when more than 125 feet
- Transverse bracing form an “X” across width of the scaffold must be installed at scaffold ends
Tube and Coupler

- When platforms are being moved to the next level, the existing platform must be left undisturbed until the new bearers have been braced and set in place.
- Couplers must be made of a structural metal.
- Couplers made from gray cast iron is prohibited.
- Designed by P.E. if over 125 feet.
Tube and Coupler (cont’d)

- Transverse bracing forming an "X" across the width of the scaffold must be installed at the scaffold ends, and at least at:
  - Every third set of posts horizontally (measured from only one end)
  - Every fourth runner vertically
- Bracing must extend upward diagonally to opposite sides of the scaffold
- Where length is greater than their height, longitudinal bracing must be repeated beginning at least at every fifth post
- On outside posts, tube and coupler guardrails and midrails may be used in lieu of outside runners
Fabricated frame

- Existing platforms remain until the frames are set / braced
  - Joined with stack pin
- Must be designed by registered engineer when over 125 ft.
Mobile

- Plumb, level and squared
- Braced to prevent collapse
- Casters and wheels locked to prevent movement while in a stationary position
- Platforms must not extend beyond the base supports of the scaffold, unless stability is ensured
Mobile (cont’d)

• Not allowed to ride on scaffolds unless the following exist
  – Surface on which scaffold is being moved is within 3 degrees of level, and free of pits, holes and obstructions
  – Height to base width ratio during movement is 2:1 or less
  – Outrigger frames, when used, are installed on both sides of the scaffold

• When power systems are used, the propelling force is:
  – Applied directly to the wheels
  – Does not produce a speed in excess of 1 foot per second

• No employee is on any part of the scaffold that extends beyond the wheels, casters, or other supports
Pump jack

- Brackets, braces must be fabricated from metal plates and angles
- Each bracket must have two positive gripping mechanisms
- Workbench may be used as a top-rail when guardrails used for fall protection
- Work benches must not be used as scaffold platforms
- Poles must be secured to structure by rigid triangular bracing, or equivalent
Ladder jack

- Must meet requirements of subpart “X”, stairways and ladders
  - Exception: Job-made ladders must not be used to support ladder jack scaffolds
- Ladder jacks must be designed and constructed to bear on:
  - Side rails and ladder rungs, or
  - Ladder rungs alone
- Ladders used to support ladder jack scaffolds must be:
  - Placed and fastened to prevent slipping
Suspended scaffolds

- Suspended scaffolds are platforms suspended by ropes, or other non-rigid means, from an overhead structure.
Two point swing stage

- Platform limited to 36”
- Platform securely fastened to hangars
- Platforms must be of ladder, plank or beam type
- Must not be bridged together unless bridge and hoist is appropriately sized
Single-point adjustable

- Supporting rope between scaffold and the suspension device must be kept vertical unless:
  - Rigging has been designed by a qualified person
  - Scaffold is accessible to rescuers
  - Support rope is protected from rubbing during direction changes, and
  - Scaffold is positioned so swinging cannot bring it into contact with other surfaces
Multi-level

- Must be equipped with additional independent support lines that are:
  - Equal in number to number of points supported
  - Equal in strength to the suspension ropes
  - Rigged to support scaffold if the suspension ropes fail

- Independent support lines and suspension ropes must not be anchored to the same points

- Supports for platforms must be attached directly to support stirrups (not to other platforms)
1926.453 - Aerial lifts

- Must meet ANSI criteria
- Secured to lower traveling position by a locking device before moving
- Ensure proper fall protection prior to using
  - Includes use of guardrails
- Lifts must allow you to access heights and work from a protected area
Aerial lifts (cont’d)

- Requires use of body belt or harness and lanyard
- Worker must stand on floor of basket
- Never exceed load capacity
- Do not move lift truck with workers in basket unless adequately designed (upper controls – personnel carriers)
- Brakes set for outrigger use (wheels chocked)
Aerial lifts (cont’d)

• Vehicle-mounted or self-propelled elevating work platforms – training is required!

All pneumatic and hydraulic components must comply with ANSI A92.2.1969 and non-critical parts must have a burst factor of 2:1
1926.454 Training

• Employees must receive training from qualified person that covers:
  – Nature of hazards, electrical, falls, and falling items
  – Use of scaffold / handling
  – Maximum intended load and load carrying capabilities of scaffold
  – Procedures for setup, dismantling or moving the system
  – Requirements of subpart “L”
Retraining

• When the employer has reason to believe an employee lacks the skill or understanding needed for safe work involving scaffolds, retraining shall be performed until proficiency is established.

• Retraining is also required when:
  – Additional or new hazards exists
  – Changes occur in the type of scaffold and fall protection exist
  – Where there are inadequacies in an employee’s work
Common OSHA Citations

- 451(g)(1) Fall protection at 10 feet
- 453(b)(2)(v) Aerial lifts – Body belt and lanyard
- 451(e)(1) Scaffold access
- 451(b)(1) Scaffold platform construction
- 454(a) Scaffold user training
Resources

• **www.osha.gov**
  – 29 CFR 1926.451
  – NSHA-OSHA Job Site Safety Handbook

• **http://www.osha.gov/publications/osha2202.html**
  – Construction Industry Digest
  – Scaffolding Industry Association

• **http://www.scaffold.org**
  – American National Standards Institute
  – A92 (SIA): Scaffolds and other elevating devices