

one shall be restrained by guying, tying, bracing, or other equivalent means sufficient to prevent tipping.

(9) *Preventing swaying and displacement.* Scaffold poles, legs, posts, and uprights shall be plumb, secure, and rigidly braced to prevent swaying and displacement.

(10) *Extending platform units beyond base supports.* Platform units shall not extend outward past the base supports of the scaffold unless outrigger supports or equivalent devices are used and will assure stability.

(g) *Boatswains' chairs.* (1) *Chair strength.* The chair shall be of a size suitable for the intended purpose, and shall be of such strength to hold the intended live load, but not less than 250 pounds (1.1 kN) without failure.

(2) *Tie backs.* Tie backs, if used, shall be approximately perpendicular to the structure face.

(3) *Personal fall protection system.* Each employee shall be protected from falling by body belts or harnesses, lanyards and lifelines, separate from the chair support system. The personal fall protection system shall meet the requirements of subpart I of this part.

(4) *Tackle.* Boatswains' chair tackle shall be correctly sized for the rope being used and the rope shall be "eye" spliced. The breaking strength of the suspension rope shall be at least 4,400 pounds (19.5 kN).

(5) *Seat slings for heat producing processes.* The seat sling shall be constructed of at least three-eighths of an inch (9.5 cm) diameter wire rope when the employee using it is conducting a heat-producing process.

§ 1910.31 Mobile elevating work platforms, mobile ladder stands and powered industrial truck platforms.

(a) *Application.* This section applies to the design and installation of platforms used in conjunction with powered industrial trucks, and to mobile elevating work platforms and mobile ladder stands. The three types of equipment covered by this section shall be collectively be referred to as "units".

(b) *General requirements.* (1) All units shall be designed, installed and maintained to support the maximum intended loads in any configuration that may be used.

(2) All units shall be given a visual inspection prior to use for defects that could cause employee injury. The employer shall ensure that the manufacturers' specifications for inspection and maintenance are met where applicable.

(3) Defective units shall be tagged "Do not use" or with a similar legend in accordance with § 1910.145, and removed from service until repaired by a qualified person.

(4) Employees shall be trained in the safe use of units before they are allowed to use them.

(5) Each unit shall be secured to prevent unintended motion while in use.

(6) The use of any device to achieve additional height on a unit is prohibited.

(7) All surfaces shall be free of hazards that can cause puncture or laceration injuries to employees.

(c) *Mobile elevating work platforms.* (1) *Minimum loading.* Units shall be capable of supporting at least 300 pounds (135 kg).

(2) *Structural safety factors.* (i) All load-supporting structural elements of the units shall have a structural safety factor of not less than two, based on the minimum yield strength of the material.

(ii) All load-supporting structural elements of units that are made of nonductile materials (such as cast iron or fiberglass) shall have a structural safety factor of not less than five, based on the allowable unit stress of the material.

(3) *Maximum platform height.* The maximum platform height of units that only elevate in the vertical plane, without any articulation, shall not exceed four times the minimum base dimensions unless the employer demonstrates that equivalent stability is provided. When greater heights are necessary, properly fitted outrigger frames, guying or bracing shall be provided.

(4) *Platforms.* Unit platforms shall meet the following requirements:

(i) The minimum platform width shall be 18 inches (46 cm).

(ii) The platform shall be provided with a fall protection system meeting the requirements of § 1910.28.

(iii) Toeboards meeting the requirements of § 1910.28 shall be provided on all sides of the platform except across access openings.

(5) *Hydraulic or pneumatic systems.* All components of a hydraulic or pneumatic system, whose failure could result in free descent or an uncontrollable fall of the unit, shall have a bursting strength that exceeds the pressure attained when the system is subjected to the equivalent of four times the system's design factor. All other hydraulic components shall have a bursting strength of at least two times the design factor.

(6) *Safety factor for wire ropes and chains.* Where the platform is supporting its maximum intended load by a system of wire ropes, chains, or both, the safety factor of the wire rope or chain shall not be less than eight to one, based on the ultimate strength of the rope or chain in use.

(7) *Elevating assembly.* The elevating assembly shall be equipped and maintained so that it will not allow a free descent or an uncontrollable fall in the event of the assembly's failure. Any unit equipped with a powered elevating assembly shall be supplied with a clearly marked means for emergency lowering that is accessible from the ground level.

(8) *Outriggers and stabilizers.* Outriggers and stabilizers shall be constructed to prevent unintentional retraction.

(9) *Lateral movement.* The employer shall assure before and during lateral movement of units that:

(i) The platform has been lowered to base level;

(ii) Tools and materials on the platform have been secured from falling or have been removed;

(iii) Employees are off the platform; and

(iv) The area the unit is being moved through has a firm footing and is cleared of obstructions.

(10) *Lowering platforms.* The area surrounding the unit shall be cleared of employees and equipment before the platform is lowered.

(d) *Mobile ladder stands.* (1) *Strength.* Mobile ladder stands shall be capable of

supporting at least four times their intended loading. The minimum design working load shall be calculated on the basis of one or more 200 pound (91 kg) persons, together with 50 pounds (23 kg) of equipment each for a combined weight of 250 pounds (114 kg) for each employee.

(2) *Maximum work surface height.* The maximum work surface heights of mobile ladder stands shall not exceed four times the least base dimension without additional support. When greater heights are needed, outrigger frames shall be employed to achieve this minimum base dimension, or the units shall be guyed or braced to prevent tipping.

(3) *Guardrails and railing systems.* (i) Units having more than five steps or 60 inches (1.5 m) in vertical height to the top step, but less than 10 feet (3 m), placed into service on or after (insert date 60 days after the effective date of the final rule in the **Federal Register**) shall have a railing system on all exposed sides and ends at least 29 inches (73.6 cm) high.

(ii) Units with a maximum work surface height of at least four feet (1.2 m), but less than 10 feet (3 m), placed into service on or after (insert date 60 days after the effective date of the final rule in the **Federal Register**) shall have a railing system on all exposed sides and ends at least 30 inches (76 cm) high.

(iii) All units placed into service before (insert date 60 days after the effective date of the final rule in the **Federal Register**) with a maximum work surface height of 10 feet (3 m) or higher, shall be protected on the exposed sides and ends with a guardrail system at least 36 inches (91 cm) high.

(iii) Units placed into service on or after (insert date 60 days after the effective date of the final rule in the **Federal Register**) and with a maximum work surface height of 10 feet (3 m) or greater, shall have a guardrail system and toeboards meeting the requirements of § 1910.28 of this subpart on all exposed sides and ends.

(iv) Removable gates and non-rigid members such as chains or other means to provide access are permitted in guardrail systems and railing systems provided that the access openings are appropriately guarded when not in use. Toeboards are not required in access openings.

(4) *Handrails.*

(i) Units having more than five steps, or units that are 60 inches (1.5 m) or greater in vertical height to the top step, placed into service before (insert 60 days after the effective date of the final rule in the **Federal Register**) shall be equipped with handrails that are at least 29 inches (73.6 cm) high (measured vertically from the center of the step) on both sides of its steps.

(ii) Units with a maximum work surface height of four feet (1.2 m) or more, placed into service on or after (insert 60 days after the effective date of the final rule in the **Federal Register**) shall be equipped with handrails meeting the requirements of § 1910.28 of the subpart on both sides of its steps.

(5) *Steps.* Steps shall be uniformly spaced and create a uniform slope, with a rise of not less than six and one-half inches (16.5 cm)