

Figure D-2 -- Side-Step Fixed Ladder Sections

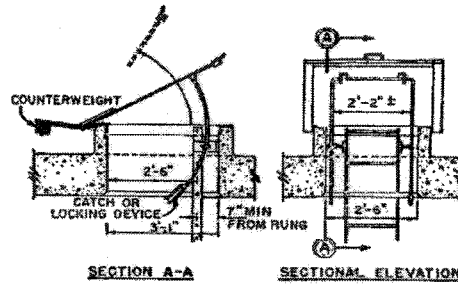


Figure D-3 -- Counterbalanced Hatch Cover at Roof

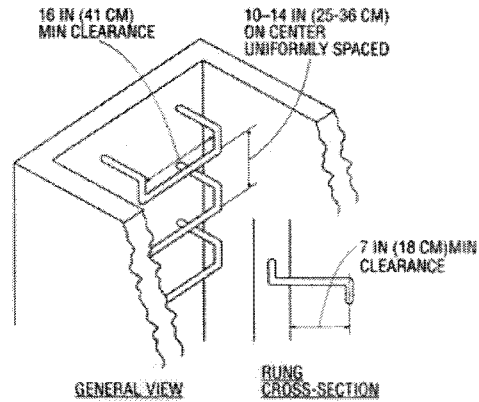


Figure D-4 -- Individual Rung Ladder

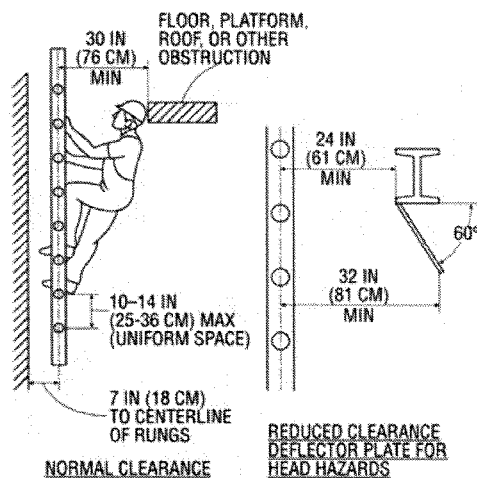


Figure D-5 -- Fixed Ladder Clearances

**BILLING CODE 4510-29-C**

(e) *Mobile ladder stands and mobile ladder stand platforms (Mobile ladder stands and platforms)*—(1) *General design requirements.* (i) Mobile ladder stands and platforms must have a step width of at least 16 inches (41 cm).

(ii) The steps, standing levels, and platforms of mobile ladder stands and platforms must be provided with a slip resistant surface. This surface may be an integral part of the surface or be provided by a secondary process or operation, e.g., dimpling, knurling, shotblasting, coating, metal spraying, or slip resistant tapes that must be durable in nature.

(iii) Wheels or casters, when under load, must be designed to support their proportional share of four times the rated load, plus the proportional share of the unit's weight.

(iv) Mobile ladder stands and platforms that use wheels or casters, rigid and swivel, must be equipped with a system to impede horizontal movement.

(v) The maximum work surface heights of mobile ladder stands and platforms must not exceed four times the least base dimension without additional support. When greater heights are needed, outriggers, counterweights, or comparable means must be used to maintain this minimum base ratio.

(vi) Mobile ladder stands and platforms must be capable of supporting at least four times their intended load.

(vii) Occupied mobile ladder stands and platforms must not be moved.

(2) *Design requirements for mobile ladder stands.* (i) Steps must be uniformly spaced and arranged with a rise of not more than 10 inches (25 cm), and a depth of not less than 7 inches (18

cm). The slope of the step stringer (inclined side support) to which the steps are attached must not be more than 60 degrees measured from the horizontal.

(ii) All ladder stands with a top step height of 4 to 10 feet (1.2 m to 3 m) must be provided with handrails having a vertical height of 29.5 inches (75 cm) to 37 inches (94 cm) measured from the front edge of a step. The use of removable gates or non-rigid members such as chains may be permitted for special use applications.

(iii) All ladder stands with a top step over 10 feet high (3 m) must have the top step protected on three sides by a handrail with a vertical height of at least 36 inches (91 cm). The use of removable gates or non-rigid members such as chains may be permitted for special use applications. Top steps that are 20 inches (51 cm) or more, front to back, must be provided with a midrail and toeboard.

(iv) The standing areas of mobile ladder stands must be within the base frame.

(3) *Design requirements for mobile ladder stand platforms.* (i) Steps of a ladder stand platform must conform to paragraph (e)(2)(i) of this section. However, when the employer demonstrates that compliance with paragraph (e)(3)(i) is not practicable, steeper slopes or vertical rung ladders may be used, provided the units are stabilized to prevent overturning.

(ii) All ladder stand platforms with a platform height of 4 to 10 feet (1.2 m to 3 m) must be provided with handrails having a vertical height of 29.5 inches (75 cm) to 37 inches (94 cm) measured from the front edge of a step. Handrails in the platform area above the flat surface must have a vertical height of at

least 36 inches (91 cm) and include a midrail. The use of removable gates or non-rigid members such as chains may be permitted for special use applications.

(iii) All ladder stand platforms with a platform height of over 10 feet (3 m) high must have guardrails and toeboards meeting the requirements of § 1910.29 on the exposed sides and ends of the platform. The use of removable gates or non-rigid members such as chains may be permitted for special use applications.

**§ 1910.24 Step bolts and manhole steps.**

(a) *Step bolts.* (1) All step bolts installed on or after (date 90 days after the effective date of the final rule) that are used in corrosive environments must be constructed of, or coated with, a material that will retard corrosion of the step bolt.

(2) Step bolts must be designed to prevent the employee's foot from slipping or sliding off the end of the step bolt.

(3) Step bolts must be spaced uniformly, 12 inches (30 cm) minimum center to center, alternately spaced, 18 inches (46 cm) maximum. (See Figure D-6.) The spacing from the entry and exit surface to the first step bolt may be different from the spacing between the other step bolts.

(4) The minimum clear width of each step bolt must be 4.5 inches (11 cm).

(5) The minimum perpendicular distance between the centerline of the step bolt to the nearest permanent object in back of the bolt must be at least 7 inches (18 cm). Where obstructions cannot be avoided, toe clearances may be reduced to 4.5 inches (11 cm).

(6) Step bolts installed before (date 90 days after the effective date of the final