

other equipment that may expand, contract, vibrate and/or move in a similar manner, need only be guarded by a toeboard or equivalent means to prevent the feet of employees from entering the hole or tools from falling through the opening and onto employees below.

Note: See § 1910.28(e) for all other floor holes.

(5) Floor hole guards shall be kept in place at all times, except when the nature of work operations require their removal, and where alternative means of protection have been provided.

(6) Employers shall install an appropriate guard, such as a toeboard which complies with § 1910.28, on the perimeter of a walking or working surface, when employees below that surface might be exposed to falling material.

§ 1910.28 Fall protection systems.

(a) *General Requirement.* (1) *Guardrail use.* Employers shall provide a guardrail system as the primary fall protection system for all walking and working surfaces regulated under this subpart unless the use of a guardrail is infeasible. When the use of a guardrail system is infeasible, the employer shall provide an appropriate alternative fall protection such as personal fall protection systems, hole covers, safety nets, etc. which complies with the requirements of this section.

(2) *Exceptions:* Employers that comply with paragraph (d) of this section need not use guardrail systems.

(b) *Guardrail systems and toeboards.* Requirements for suspension scaffold fall protection systems are contained in § 1910.30. All other guardrail systems and their components shall meet the following criteria:

(1) *Top rails.* The top rail or member of a guardrail system shall be capable of withstanding, without failure, a force of at least 200 pounds (890 N) applied within two inches (5 cm) of the top edge of the rail in any downward or outward direction at any point along the top edge. For guardrail systems installed before (*insert date 60 days after the effective date of the final rule in the Federal Register*) when the 200 pound (890 N) test load is applied in a downward direction, the top edge of the guardrail shall not be less than 36 inches (91 cm) above the guarded surface level. For guardrail systems, other than those which comply with paragraph (b)(3)(iii) of this section installed on or after (*insert date 60 days after the effective date of the final rule in the Federal Register*) when the 200 pound (890 N) test load is applied in a downward direction, the top edge of the guardrail shall not be less than 39 inches (1 m) above the guarded surface level. No permanent deformation is permitted in the system when the force is removed.

(2) *Midrails.* (i) Midrails, screens, mesh, intermediate vertical members, solid panels, or equivalent structural members shall be provided between the top rail of the guardrail system and the work surface.

(ii) Midrails and equivalent structural members shall be capable of withstanding, without failure, a force of at least 150 pounds

(667 N) applied in any downward or outward direction at any point along the midrail. No permanent deformation is permitted in the system when the force is removed.

(iii) Midrails and other intermediate members shall be positioned so that the openings in the guardrail system are a maximum of 19 inches (48 cm) in their least dimension.

(3) *Height criteria.* (i) The top member of guardrail systems installed before (*insert date 60 days after the effective date of publication of the final rule in the Federal Register*) shall be at least 36 inches (91 cm) above the work surface under all conditions.

(ii) The height of the top rail or equivalent component of guardrail systems installed on or after (*insert date 60 days after the effective date of the final rule in the Federal Register*) shall be at least 42 inches (1.1 m) above the walking or working surface. Employers may build up the walking and working surface provided the requirements of paragraph (b)(1) of this section are met.

(iii) As an alternative to complying with paragraphs (b)(3)(i) and (b)(3)(ii) of this section, employers may reduce the height of the top surface of a guardrail system to no less than 30 inches (76 cm) at any point, provided the sum of the depth (horizontal distance) of the top edge, and the height of the top edge (vertical distance from the work surface to the top edge of the top member), is at least 48 inches (1.2 m).

(4) *Surfaces of guardrails.* Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing which could cause an employee to fall.

(5) *Size criteria.* Top rails and midrails shall be at least one-quarter inch (0.6 cm) in outside diameter or thickness.

(6) *Access openings.* Employers may use movable guardrail sections using such materials as gates, non-rigid members and chains to provide access when opened and guardrail protection when closed, provided the criteria in paragraphs (b)(1) through (b)(5) of this section. Toeboards are not required in access openings.

(7) *Toeboard requirements.* (i) Toeboards shall be capable of withstanding, without failure, an outward force of at least 50 pounds (222 N) applied at any point in the direction of the exposed perimeter.

(ii) Toeboards shall be at least three and one-half inches (8.9 cm) in vertical height from their top edge to the level of the work surface.

(iii) Toeboards shall not be placed more than one-half inch (1.3 cm) above the work surface. They shall be solid or have openings not over one inch (2.5 cm) in their greatest dimension.

(c) *Handrail and stair rail systems.* (1) *Strength criteria.* Handrails and the top rails of stair rail systems shall be capable of withstanding, without permanent deformation or a loss of support, a force in any downward or outward direction at any point along the top edge, of at least 200 pounds (890 N) applied within two inches (5 cm) of the top edge of the rail.

(2) *Height criteria.* (i) The height of handrails installed before (*insert date 60 days*

after date of the final rule in the Federal Register) shall not be less than 30 inches (76 cm) nor more than 42 inches (1.1 m) from the top of the handrail to the surface of the tread in line with the face of the riser at the forward edge of the tread.

(ii) The height of handrails installed on or after (*insert date 60 days after the effective date of the final rule in the Federal Register*) shall not be more than 37 inches (94 cm) nor less than 30 inches (76 cm) when measured in a manner consistent with the method described in (c)(2)(i) above.

(iii) The height of stair rail systems installed before (*insert date 60 days after the effective date of the final rule in the Federal Register*) shall not be less than 30 inches (76 cm) from the upper surface of the tread. This distance shall be measured in a vertical direction at the intersection of the riser face and tread surface, or in the case of open risers, at the forward edge of the tread surface.

(iv) The height of stair rail systems installed on or after (*insert date 60 days after the effective date of the final rule in the Federal Register*) shall be not less than 36 inches (91 cm) when measured in a manner consistent with the method described in (c)(2)(iii) of this section.

(v) A stair rail installed before (*insert date 60 days after the effective date of the final rule in the Federal Register*) may also serve as a handrail when the height of the top edge is not more than 42 inches (1.1 m) nor less than 36 inches (91 cm) when measured at the forward edge of the tread surface.

(vi) A stair rail installed on or after (*insert date 60 days after the effective date of the final rule in the Federal Register*) may also serve as a handrail when the height of the top edge is not more than 37 inches (94 cm) nor less than 36 inches (91 cm) when measured at the forward edge of the tread surface.

(3) *Finger clearance.* The minimum clearance between handrails, including the top edge of stair rail systems serving as handrails, and any obstructions shall be one and one-half inches (4 cm).

(4) *Surfaces.* Handrail and stair rail systems shall be surfaced to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.

(5) *Openings in stair rails.* Openings in a stair rail system shall be a maximum of 19 inches (48 cm) in their least dimension.

(6) *Handhold.* Handrails shall have the shape and dimension necessary to provide a firm handhold for employees.

(7) *Projection hazards.* Ends of stair rail systems and handrails shall not present a projection hazard.

(d) *Designated areas.* (1) *General requirements for use.* Employers may establish designated areas which comply with the provisions of this paragraph as an alternative to installing guardrails, where employers demonstrate that employees within the designated areas are not exposed to fall hazards. In addition, the following conditions and requirements must be met in order to use designated areas in lieu of other fall protection measures:

(a) The work must be of a temporary nature, such as maintenance on roof top equipment.