

Appendix G to Chapter 12-133.2
Section 1926.502(b)-(e) Fall Protection Systems Criteria and
Practices - Mandatory

- (b) Guardrail systems. Guardrail systems and their use shall comply with the following provisions:
- (1) Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches (1.1 m) plus or minus 3 inches (8 cm) above the walking/working level. When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria of this paragraph (§1926.502(b)).
Note: When employees are using stilts, the top edge height of the top rail, or equivalent member, shall be increased an amount equal to the height of the stilts.
 - (2) Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches (53 cm) high.
 - (i) Midrails, when used, shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.
 - (ii) Screens and mesh, when used, shall extend from the top rail to the walking/working level and along the entire opening between top rail supports.
 - (iii) Intermediate members (such as balusters), when used between posts, shall be not more than 19 inches (48 cm) apart.
 - (iv) Other structural members (such as additional midrails and architectural panels) shall be installed such that there are no openings in the guardrail system that are more than 19 inches (.5 m) wide.
 - (3) Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 N) applied within 2 inches (5.1 cm) of the top edge, in any outward or downward direction, at any point along the top edge.
 - (4) When the 200 pound (890 N) test load specified in paragraph (b)(3) of this section (§1926.502) is applied in a downward direction, the top edge of the guardrail shall not deflect to a height less than 39 inches (1.0 m) above the walking/working level. Guardrail system components selected and constructed in accordance with the appendix B to chapter 12-121.2 will be deemed to meet this requirement.
 - (5) Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding, without failure, a force of at least 150 pounds (666 N) applied in any downward or outward direction at any point along the midrail or other member.
 - (6) Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.
 - (7) The ends of all top rails and midrails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.
 - (8) Steel banding and plastic banding shall not be used as top rails or midrails.
 - (9) Top rails and midrails shall be at least one-quarter inch (0.6 cm) nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it shall be flagged at not more than 6-foot intervals with high-visibility material.

- (10) When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section shall be placed across the access opening between guardrail sections when hoisting operations are not taking place.
 - (11) When guardrail systems are used at holes, they shall be erected on all unprotected sides or edges of the hole.
 - (12) When guardrail systems are used around holes used for the passage of materials, the hole shall have not more than two sides provided with removable guardrail sections to allow the passage of materials. When the hole is not in use, it shall be closed over with a cover, or a guardrail system shall be provided along all unprotected sides or edges.
 - (13) When guardrail systems are used around holes which are used as points of access (such as ladderways), they shall be provided with a gate, or be so offset that a person cannot walk directly into the hole.
 - (14) Guardrail systems used on ramps and runways shall be erected along each unprotected side or edge.
 - (15) Manila, plastic or synthetic rope being used for top rails or midrails shall be inspected as frequently as necessary to ensure that it continues to meet the strength requirements of paragraph (b)(3) of this section (§1926.502).
- (c) Safety net systems. Safety net systems and their use shall comply with the following provisions:
- (1) Safety nets shall be installed as close as practicable under the walking/working surface on which employees are working, but in no case more than 30 feet (9.1 m) below such level. When nets are used on bridges, the potential fall area from the walking/working surface to the net shall be unobstructed.
 - (2) Safety nets shall extend outward from the outermost projection of the work surface as follows:

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 5 feet	8 feet
More than 5 feet up to 10 feet	10 feet
More than 10 feet	13 feet
 - (3) Safety nets shall be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified in paragraph (4) of this section §1926.502.
 - (4) Safety nets and their installations shall be capable of absorbing an impact force equal to that produced by the drop test specified in paragraph (c)(4)(i) of this section (§1926.502).
 - (i) Except as provided in paragraph (c)(4)(ii) of this section (§1926.502), safety nets and safety net installations shall be drop-tested at the jobsite after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at 6-month intervals if left in one place. The drop-test shall consist of a 400 pound (180 kg) bag of sand 30+ or -2 inches (76+ or -5 cm) in diameter dropped into the net from the highest walking/working surface at which employees are exposed to fall hazards, but not from less than 42 inches (1.1 m) above that level.
 - (ii) When the employer can demonstrate that it is unreasonable to

perform the drop-test required by paragraph (c)(4)(i) of this section (§1926.502), the employer (or a designated competent person) shall certify that the net and net installation is in compliance with the provisions of paragraphs (c)(3) and (c)(4)(i) of this section (§1926.502) by preparing a certification record prior to the net being used as a fall protection system. The certification record must include an identification of the net and net installation for which the certification record is being prepared; the date that it was determined that the identified net and net installation were in compliance with paragraph (c)(3) of this section (§1926.502) and the signature of the person making the determination and certification. The most recent certification record for each net and net installation shall be available at the jobsite for inspection.

- (5) Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. Defective components shall be removed from service. Safety nets shall also be inspected after any occurrence which could affect the integrity of the safety net system.
 - (6) Materials, scrap pieces, equipment, and tools which have fallen into the safety net shall be removed as soon as possible from the net and at least before the next work shift.
 - (7) The maximum size of each safety net mesh opening shall not exceed 36 square inches (230 cm) nor be longer than 6 inches (15 cm) on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not be longer than 6 inches (15 cm). All mesh crossings shall be secured to prevent enlargement of the mesh opening.
 - (8) Each safety net (or section of it) shall have a border rope for webbing with a minimum breaking strength of 5,000 pounds (22.2 kN).
 - (9) Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than 6 inches (15 cm) apart.
- (d) Personal fall arrest systems. Personal fall arrest systems and their use shall comply with the provisions set forth below. Effective January 1, 1998, body belts are not acceptable as part of a personal fall arrest system.
- Note:** The use of a body belt in a positioning device system is acceptable and is regulated under paragraph (e) of this section (§1926.502).
- (1) Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.
 - (2) Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.
 - (3) Dee-rings and snaphooks shall have a minimum tensile strength of 5,000 pounds (22.2 kN).
 - (4) Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.
 - (5) Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member. Effective January 1, 1998, only locking type snaphooks shall be used.
 - (6) Unless the snaphook is a locking type and designed for the following

- connections, snaphooks shall not be engaged:
- (i) Directly to webbing, rope or wire rope;
 - (ii) To each other;
 - (iii) To a dee-ring to which another snaphook or other connector is attached;
 - (iv) To a horizontal lifeline; or
 - (v) To any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.
- (7) On suspended scaffolds or similar work platforms with horizontal lifelines which may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions on the lifeline.
- (8) Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.
- (9) Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2kN).
- (10) (i) Except as provided in paragraph (d)(10)(ii) of this section §1926.502), when vertical lifelines are used, each employee shall be attached to a separate lifeline.
- (ii) During the construction of elevator shafts, two employees may be attached to the same lifeline in the hoistway, provided both employees are working atop a false car that is equipped with guardrails; the strength of the lifeline is 10,000 pounds (5,000 pounds per employee attached) (44.4 kN); and all other criteria specified in this paragraph for lifelines have been met.
- (11) Lifelines shall be protected against being cut or abraded.
- (12) Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 feet (0.61 m) or less shall be capable of sustaining a minimum tensile load of 3,000 pounds (13.3 kN) applied to the device with the lifeline or lanyard in the fully extended position.
- (13) Self-retracting lifelines and lanyards which do not limit free fall distance to 2 feet (0.61 m) or less, ripstitch lanyards, and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kN) applied to the device with the lifeline or lanyard in the fully extended position.
- (14) Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made from synthetic fibers.
- (15) Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or shall be designed, installed, and used as follows:
- (i) As part of a complete personal fall arrest system which maintains a safety factor of at least two; and
 - (ii) Under the supervision of a qualified person.
- (16) Personal fall arrest systems, when stopping a fall, shall:
- (i) Limit maximum arresting force on an employee to 900 pounds (4 kN) when used with a body belt;
 - (ii) Limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness;
 - (iii) Be rigged such that an employee can neither free fall more than

- 6 feet (1.8 m), nor contact any lower level;
- (iv) Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet (1.07 m); and,
 - (v) Have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1.8 m), or the free fall distance permitted by the system, whichever is less.
- Note:** If the personal fall arrest system meets the criteria and protocols contained in Appendix C to chapter 12-121.2, and if the system is being used by an employee having a combined person and tool weight of less than 310 pounds (140 kg), the system will be considered to be in compliance with the provisions of paragraph (d)(16) of this section (§1926.502). If the system is used by an employee having a combined tool and body weight of 310 pounds (140 kg) or more, then the employer must appropriately modify the criteria and protocols of the Appendix to provide proper protection for such heavier weights, or the system will not be deemed to be in compliance with the requirements of paragraph (d)(16) of this section (§1926.502).
- (17) The attachment point of the body belt shall be located in the center of the wearer's back. The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.
 - (18) Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.
 - (19) Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.
 - (20) The employer shall provide for prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves.
 - (21) Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.
 - (22) Body belts shall be at least one and five-eighths (15/8) inches (4.1 cm) wide.
 - (23) Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists except as specified in other sections of the Part 3 Construction standards.
 - (24) When a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.
- (e) Positioning device systems. Positioning device systems and their use shall conform to the following provisions:
- (1) Positioning devices shall be rigged such that an employee cannot free fall more than 2 feet (.9 m).
 - (2) Positioning devices shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds (13.3 kN), whichever is greater.
 - (3) Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

- (4) Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of this system.
- (5) Connecting assemblies shall have a minimum tensile strength of 5,000 pounds (22.2 kN).
- (6) Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.
- (7) Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member. As of January 1, 1998, only locking type snaphooks shall be used.
- (8) Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:
 - (i) Directly to webbing, rope or wire rope;
 - (ii) To each other;
 - (iii) To a dee-ring to which another snaphook or other connector is attached;
 - (iv) To a horizontal lifeline; or to depress the snaphook keeper and release itself; and
 - (v) To any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.
- (9) Positioning device systems shall be inspected prior to each use for wear, damage, and other deterioration, and defective components shall be removed from service.
- (10) Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.