



## **Fall Protection Program**

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## INTRODUCTION

### **Policy Statement**

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“It is Bowling Green State University’s policy to comply with the occupational safety and health standards of the Ohio Public Employees Risk Reduction Act and all applicable Federal, State, and Local rules, regulations, and directives.”

Approved: October 7, 1994  
Board of Trustees

### **Forward**

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In 1970, the United States Congress established the right of workers to "safe and healthful working conditions" through the Occupational Safety and Health Act. This act created the Occupational Safety and Health Administration (OSHA). In July, 1994 the State of Ohio adopted and incorporated, by reference, many of the Federal OSHA standards through the Public Employee Risk Reduction Act, Ohio Revised Code 4167.07. This act and its subsequent rules (Ohio Administrative Code 4167-3-01) require Bowling Green State University and other state institutions to comply with all applicable OSHA standards. Although 29 CFR 1926.500 applies specifically to the construction industry, it will be incorporated into the following program.

### **Objective**

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The purpose of the University’s Fall Protection Program is to ensure that affected employees can identify and control fall hazards in order to protect themselves against those hazards. This program shall be used in conjunction with BGSU policies and procedures involving the protection of workers in the workplace.

### **Applicability**

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This program applies to all University employees who’s position requires them to walk or work on unprotected sides and edges, leading edges, unprotected holes and roofs 6 feet or more above a lower level.

This program does NOT apply when individuals are making an inspection, investigation or assessment of workplace conditions prior to the start of construction work or after construction work has been completed, unless the employee or supervisor deems it necessary.

The following fall hazards are NOT covered under the scope of this program:

- Stairways, portable ladders and fixed ladders less than 20 feet in height;
- Construction of electric transmission and distribution lines and equipment;
- Steel erection;
- Cranes and derricks as noted in 29CFR 1926 Subpart N and;
- Scaffolding.

Fall protection requirements regarding these situations are found in other parts of the OSHA Construction and General Industry Standards. In addition, this program does NOT cover retrieval equipment used for confined spaces on campus.

## **Responsibilities**

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Occupational Safety and Health Specialist, Environmental Health and Safety is responsible for

- coordinating the Fall Protection Program;
- providing guidance and technical assistance to departments regarding the Fall Protection Program including complaints, concerns and suggestions;
- assisting departments with training;
- Maintaining copies of all reported campus injuries related to falls from elevated surfaces involving staff, students, and visitors and investigate these injuries when necessary.

Management (Department Chairperson and Director) is responsible for

- supplying fall protection equipment at no cost to employees and;
- providing employees with adequate training.

Supervisors are responsible for

- identifying the activities and locations where fall hazards exist;
- issuing fall protection equipment, and providing employees with the manufacturer's instructions for use, care, limitations, and warnings;
- ensuring that training is provided;
- enforcing the Fall Protection Program by ensuring that all subordinates comply with all facets of the program and;
- providing a copy of the Fall Protection Program upon their request.

Employees are responsible for

- attending fall protection training offered by Environmental Health and Safety;
- properly using and caring for fall protective equipment;
- following the Fall Protection program requirements;
- reporting any problems to your immediate supervisor that are observed which could compromise health and safety and;
- ensuring no other individuals are exposed to fall hazards based on the operations being conducted.

### **Program Enforcement**

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A violation of a University employee's responsibility must be reported to the employee's immediate supervisor for appropriate action.

## **FALL PROTECTION SELECTION**

Prior to the selection of any fall protection method, the strength of the walking/working surface shall be determined by a competent person or supervisor. The walking/working surface shall be capable of supporting the expected loads, including a safety factor. OSHA generally encourages the employer to select engineering controls first when attempting to control a hazard. Examples of engineering controls include guardrails, barriers, and covers. Section 1926.501, Appendix B, lists the acceptable fall protection methods for various situations.

### **Site Specific Fall Protection Plan**

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Site Specific Fall Protection Plans (SSFPP) will generally not be used by the University as a means of protecting employees/students from falls. Environmental Health and Safety will work with supervisors to provide a physical means of fall protection for all workers.

### **Guardrail Construction Details**

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1926.502 (b) in Appendix B details guardrail construction. Important points to consider include a toeboard, height of the rails, midrails or screens, and strength requirements. When an individual's center of gravity is located outside of the protection offered by the guardrails, alternative fall protection is necessary. Examples of this situation include individuals working on stilts, leaning over, through, or under guardrails to perform work, or employees on portable ladders working near the edge of a roof, open-window, or floor opening. Guardrails can be used for many fall protection applications.

### **Safety Nets**

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Again, the use of nets is generally not a feasible means of fall protection, but does have applications when other physical means of fall protection is not practical. If a supervisor is considering the use of nets, please contact the Safety Department.

### **Positioning Devices**

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Positioning devices such as safety belts are no longer an acceptable means of fall protection. Full-body harnesses must be used for fall hazard protection. See section 1926.502 (e) in Appendix B regarding positioning device requirements. Note the strength for snaphook requirements for positioning devices.

### **Warning Line System**

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Warning lines may be used on low-sloped roofs in combination with other controls such as safety monitors, guardrails and personal fall arresting equipment or nets. Warning lines shall be made of rope, wire, or chains and flagged every six feet with highly visible

material. The line shall be supported by stanchions and the line shall be between 34 and 39 inches above the walking/working surface. The stanchions shall be capable of withstanding a horizontal force of 18lbs. without tipping over. The warning line shall have a minimum tensile strength of 500lbs. Additional details regarding warning lines can be found in 1926.502(f) of Appendix B.

### **Controlled Access Zones (CAZ's)**

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A controlled access zone may be used as an option for overhand bricklaying and related activities or as part of a Site Specific Fall Protection Plan. Only authorized employees may enter this zone. Controlled access zones shall be provided between six and twenty-five feet from an unprotected or leading edge, except for precast concrete work. The controlled access zones will be marked by a line that consists of rope, wire, tape or equivalent materials, supported by stanchions and flagged every six feet. The line must have a minimum breaking strength of 200lbs. and be located between 39 and 45 inches above the walking/working surface. The line must be approximately parallel to the leading edge or exposed edge, and should be fastened to a secure surface such as a guardrail.

### **Safety Monitoring**

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For this section, the term “at risk” individual shall be an individual potentially exposed to a fall hazard.

A safety monitor is a competent individual (able to recognize fall hazards), located on the same working/walking surface as other at-risk individuals, who shall warn the individuals if they are acting in an unsafe manner that could result in a fall or are unaware of a fall hazard. The monitor shall be able to see the employees, not have other immediate work responsibilities, and orally communicate with the at-risk individuals. Safety monitors may be used on low sloped roofs less than 50 feet in width as the sole means of protection. Safety monitors may be used for low-sloped roof work in combination with other controls or in a Site Specific Fall Protection Plans. See section 1926.502 (h) in Appendix B for additional details regarding safety monitors.

### **Covers**

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Covers shall be capable of withstanding at least twice the expected maximum load. The load could be any of the following based on the project: axle load, weight of equipment, or weight of person. Consideration should be given to concentrated and impact loads. The covers shall be secured to prevent movement and either color coded or labeled “HOLE” or “COVER”. See section 1926.502 (i) in Appendix B for additional details.

## **Personal Fall Arresting Equipment**

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Personal fall arresting equipment should be purchased from a single manufacturer. The equipment is tested as a system and substitution of equipment from another manufacturer of personal fall arrest equipment could result in a component or system failure. It is important to realize that components from a single manufacturer may not be compatible with all types of fall protection equipment. Personal fall arresting equipment shall be used only for this purpose. Personal fall arresting equipment and associated system components are designed for a combined weight (employee plus tools, etc.) of 310lbs. If the combined weight exceeds 310lbs., system modifications may be necessary.

Free-fall distance shall be kept at a minimum. In no cases shall the free-fall distance exceed 6 feet. Free fall in excess of this distance can result in system failure and/or injury. In most situations the anchor point should be located near or above the shoulder level. In selecting fall protection equipment, consideration should be given to the possibility of injuries associated with “swinging” after the fall, retrieval and the location of where the individual will be after the fall.

Consideration should be given to conditions that could affect the performance of the equipment selected. The following is a short list of conditions that could adversely affect the equipment being used: temperature extremes, use of corrosive substances (solids, liquids, or gases), welding /torch cutting, abrasive blasting, high moisture, grease/oil, and chemicals. Wire rope should never be used where an electrical hazard exists, nor should it be used without a shock-absorbing lanyard.

Safety belts are not acceptable for personal fall arrest equipment, but may be used for positioning. Equipment designed for fall protection shall not be used for positioning. Shock absorbing lanyards shall be used where possible. Lanyards, lifelines, full-body harnesses shall be protected against abrasion or cutting. Special beam wraps are available for anchor points that would cause a lanyard to abrade or be cut. See your supervisor for information on using beam wraps.

## **Anchor Points**

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Anchor points must be capable of supporting 5000 lbs. per attached employee. The adequacy of an anchor point must be determined by a competent individual. Where there is doubt about the strength of an anchor point, an engineer must be consulted. Permanently installed anchor points should be provided for fall hazards that are routinely encountered. Anchor points for fall protection and exposed to corrosive conditions (acids, bases, moisture) should be corrosive-resistant.

## TRAINING AND EDUCATION

### **Training**

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#### Fall Protection<sub>1</sub> Training Session

This training session is provided by Environmental Health and Safety and is intended for supervisors. The following information will be covered:

- an overview of fall protection hazards and control measures;
- the importance of fall protection systems including fall related injuries;
- a brief summary of the OSHA standards relating to fall protection;
- an overview of BGSU's written Fall Protection Program and;
- an explanation of how Environmental Health and Safety can assist areas and departments in implementation of the program.

#### Fall Protection<sub>2</sub> Training Session

Each employee exposed to a fall hazard shall be trained to recognize the hazards and take action to prevent a fall. Training shall be provided by a competent person and shall cover the following topics:

- the nature of the fall hazard;
- the correct procedures for erecting, maintaining, disassembling and inspecting the fall protection system to be used;
- the use and operation of guardrails, personal fall arrest systems, safety net system, warning line system, safety monitoring systems, controlled access zones and other protection to be used;
- the role of each employee in the safety monitoring system;
- the limitations of the use of mechanical equipment during the performance of roofing work on low-sloped roofs;
- the correct procedure for the handling and storage of equipment and materials and the erection of overhead protection;
- the role of employees in the Fall Protection Program and;
- the OSHA Fall Protection Standard.

## **Retraining**

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Retraining (refresher) shall be provided when any one of the following exists:

- changes in the workplace or fall protection equipment that render previous training obsolete or;
- if the individual demonstrates a lack of knowledge regarding the basic components of the Fall Protection Program and;
- at intervals deemed acceptable by the supervisor.

## EQUIPMENT INSPECTION

Personal fall arresting equipment (body harness, lanyard) that has been subjected to a significant fall shall be discarded. Equipment shall be maintained in accordance with the manufacturer's guidelines and inspected prior to each use.

The following should be checked:

**D-Rings** - Cracks, distortion, corrosion, pitting, or excessive wear.

**Buckles** – Distortion, sharp edges or cracks.

**Body Harness** – burns, damage due to chemicals, cuts, abrasion to the material, or broken stitches. One of the best ways to check the material is to hold sections of the material between the hands and bend the material into a U-shape to look for damage.

**Keepers and Snap locks** – Make sure they operate correctly. Do not rely on the sound of the latches, they must be connected.

**Retractable Lines** – They should operate smoothly. The rope or cable should not be damaged. A quick pull of the line should cause the line to lock. The retractable lifeline assemblies shall be returned to the factory for recertification as specified by the manufacturer. In most cases, the manufacturer specifies an annual inspection. Check the date on the unit for the last certification.

**Lanyard** – (rope, webbed, or cable) – Look for cuts, frayed parts, damaged fibers, and the condition of connections. There should be no knots in the line. A knot can result in a substantial reduction in strength.

**Shock Absorber** – Check for ripped stitches, signs of impact loading and connections.

## **POSTING OF FALL HAZARDS**

Fixed (non-transient) fall hazards that are routinely encountered should be posted with signs stating “Fall Protection Required”. The signs shall be posted at a location where the fall hazard is first encountered. If there are multiple entry points where the fall hazard is encountered, each location should be posted. Signs shall be posted by the department that has control of the fall hazard.

## **HEAD PROTECTION**

The Fall Protection Program is based on individuals working at least six feet above a lower level. It is presumed that the potential for head injuries exists for any person(s) at the lower level. Hardhats should be donned by all individuals, including visitors, on a job where a fall hazard exists.

## **PROVISIONS FOR RESCUE**

Provisions shall be made for the rescue of employees who have fallen into a net or are suspended by their personal fall arresting equipment. Such provisions shall take the form of ladders, lifts, ropes, combined fall arresting/retrieval body harnesses, etc. If the rescue is likely to endanger the individual who has fallen, or the rescuers, call 911 to initiate the rescue process.

## **FALL PROTECTION CONSIDERATIONS FOR NEW CONSTRUCTION AND RENOVATIONS**

All new construction must provide fall protection in accordance with applicable building codes. One factor that may be overlooked is the provision for fall protection during building maintenance (e.g. roofing). Provisions should be incorporated into the building design by the University or Contracted Engineers for fall protection anchoring devices. Anchor points and cable or rail systems for fixed ladders are two examples of overlooked features.

## **APPENDIX A – DEFINITIONS**

## DEFINITIONS

**Anchorage:** means a secure point of attachment for lifelines, lanyards or deceleration devices.

**Body Belt (Safety Belt):** a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

**Body Harness:** straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

**Buckle:** any device for holding the body belt or body harness closed around the employee's body.

**Connector:** a device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiner, or it may be an integral part of the system (such as a buckle or dee-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

**Controlled Access Zone (CAZ):** an area which certain work (overhand bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.

**Dangerous Equipment:** equipment (such as pickling or galvanizing tanks, degreasing units, machinery, electrical equipment, and other units) which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

**Deceleration Device** means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

**Deceleration Distance:** the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

**Equivalent:** alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials, or designs specified in the Standard.

**Failure:** load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

**Free Fall:** the act of falling before a personal fall arrest system begins to apply force to arrest a fall.

**Free Fall Distance:** the vertical displacement of the fall arrest attachment point on the employee's body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

**Guardrail System:** a barrier erected to prevent employees from falling to lower levels.

**Hole:** a gap or void 2 inches (5.1cm) or more in its least dimension, in a floor, roof, or other walking/working surface.

**Infeasible:** that it is impossible to perform the construction work using conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection. (Infeasibility for any situation will be determined by the Safety Department).

**Lanyard:** a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body harness to a deceleration device, lifeline, or anchorage.

**Leading Edge:** the edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side or edge" during periods when it is not actively and continuously under construction.

**Lifeline:** a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

**Low-Sloped Roof:** a roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

**Lower Levels:** those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

**Mechanical Equipment:** all motor or human propelled wheeled equipment used for roofing work, except wheelbarrows and mopcars.

**Opening:** a gap or void 30 inches or more high and 18 inches or more wide, in a wall partition, through which employees can fall to a lower level.

**Overhand bricklaying or Related Work:** the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring to the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

**NOTE:** Brick masons are required to maintain, at a minimum, an 18 inch wall in front of them at all times during the masonry construction work of the wall.

**Personal Fall Arrest System:** a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. As of January 1, 1998 body belts used for fall arrest is prohibited.

**Positioning Device System:** a body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

**Rope Grab:** a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

**Rope:** the exterior surface of the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily becomes the top surface of a building.

**Safety-Monitoring System:** a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

**Self-Retracting Lifeline/Lanyard:** a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

**Snaphook:** a connector of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object.

**Steep Roof:** a roof having a slope greater than 4 in 12 (vertical to horizontal).

**Toeboard:** a low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

**Unprotected Sides and Edges:** any edge or side (except at entrances to points of access) of a walking/working surface, e.g. floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches high.

**Waling/Working Surface:** any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork, and concrete reinforcing steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

**Warning Line System:** a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without the use of guardrail, body harness, or safety net system to protect employees in the area.

**Work Area:** that portion of a walking/working surface where job duties are being performed.

**APPENDIX B – 29 CFR 1926 SUBPART M**

## 29 CFR 1926 SUBPART M

### Regulations (Standards - 29 CFR)

#### Scope, application, and definitions applicable to this subpart. - 1926.500

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##### 1926.500(a)

#### **Scope and application.**

##### 1926.500(a)(1)

This subpart sets forth requirements and criteria for fall protection in construction workplaces covered under 29 CFR part 1926. Exception: The provisions of this subpart do not apply when employees are making an inspection, investigation, or assessment of workplace conditions prior to the actual start of construction work or after all construction work has been completed.

##### 1926.500(a)(2)

Section 1926.501 sets forth those workplaces, conditions, operations, and circumstances for which fall protection shall be provided except as follows:

##### 1926.500(a)(2)(i)

Requirements relating to fall protection for employees working on scaffolds are provided in subpart L of this part.

##### 1926.500(a)(2)(ii)

Requirements relating to fall protection for employees working on certain cranes and derricks are provided in subpart N of this part.

#### **..1926.500(a)(2)(iii)**

##### 1926.500(a)(2)(iii)

Fall protection requirements for employees performing steel erection work (except for towers and tanks) are provided in subpart R of this part.

##### 1926.500(a)(2)(iv)

Section 1926.502 does not apply to the erection of tanks and communication and broadcast towers. (Note: Section 1926.104 sets the criteria for body belts, lanyards and lifelines used for fall protection during tank and communication and broadcast tower erection. Paragraphs (b),(c) and (f) of § 1926.107 provide definitions for the pertinent terms.)

##### 1926.500(a)(2)(v)

Requirements relating to fall protection for employees engaged in the erection of tanks and communication and broadcast towers are provided in § 1926.105.

##### 1926.500(a)(2)(vi)

Requirements relating to fall protection for employees engaged in the construction of electric transmission and distribution lines and equipment are provided in subpart V of this part.

##### 1926.500(a)(2)(vii)

Requirements relating to fall protection for employees working on stairways and ladders are provided in subpart X of this part.

##### 1926.500(a)(3)

Section 1926.502 sets forth the requirements for the installation, construction, and proper use

of fall protection required by part 1926, except as follows:

**1926.500(a)(3)(i)**

Performance requirements for guardrail systems used on scaffolds and performance requirements for falling object protection used on scaffolds are provided in subpart L of this part.

**1926.500(a)(3)(ii)**

Performance requirements for stairways, stairrail systems, and handrails are provided in subpart X of this part.

**..1926.500(a)(3)(iii)**

**1926.500(a)(3)(iii)**

Additional performance requirements for personal climbing equipment, lineman's body belts, safety straps, and lanyards are provided in Subpart V of this part.

**1926.500(a)(3)(iv)**

Section 1926.502 does not apply to steel erection activities. (Note: Section 1926.104 sets the criteria for body belts, lanyards and lifelines used for fall protection in steel erection activities. Paragraphs (b), (c) and (f) of 1926.107 provide definitions for the pertinent terms).

**1926.500(a)(4)**

Section 1926.503 sets forth requirements for training in the installation and use of fall protection systems, except in relation to steel erection activities.

**1926.500(b)**

**Definitions.**

**Anchorage** means a secure point of attachment for lifelines, lanyards or deceleration devices.

**Body belt (safety belt)** means a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

**Body harness** means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

**Buckle** means any device for holding the body belt or body harness closed around the employee's body.

**Connector** means a device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or dee-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

**Controlled access zone (CAZ)** means an area in which certain work (e.g., overhead bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.

**Dangerous equipment** means equipment (such as pickling or galvanizing tanks, degreasing units, machinery, electrical equipment, and other units) which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

**Deceleration device** means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

**Deceleration distance** means the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

**Equivalent** means alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

**Failure** means load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

**Free fall** means the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

**Free fall distance** means the vertical displacement of the fall arrest attachment point on the employee's body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

**Guardrail system** means a barrier erected to prevent employees from falling to lower levels.

**Hole** means a gap or void 2 inches (5.1 cm) or more in its least dimension, in a floor, roof, or other walking/working surface.

**Infeasible** means that it is impossible to perform the construction work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

**Lanyard** means a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

**Leading edge** means the edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is

considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

**Lifeline** means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

**Low-slope roof** means a roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

**Lower levels** means those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

**Mechanical equipment** means all motor or human propelled wheeled equipment used for roofing work, except wheelbarrows and mopcars.

**Opening** means a gap or void 30 inches (76 cm) or more high and 18 inches (48 cm) or more wide, in a wall or partition, through which employees can fall to a lower level.

**Overhand bricklaying and related work** means the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

**Personal fall arrest system** means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

**Positioning device system** means a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

**Rope grab** means a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

**Roof** means the exterior surface on the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily become the top surface of a building.

**Roofing work** means the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

**Safety-monitoring system** means a safety system in which a competent person is

responsible for recognizing and warning employees of fall hazards.

**Self-retracting lifeline/lanyard** means a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

**Snaphook** means a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snaphooks are generally one of two types:

1926.500(b)(1)

The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection; or

1926.500(b)(2)

The non-locking type with a self-closing keeper which remains closed until pressed open for connection or disconnection. As of January 1, 1998, the use of a non-locking snaphook as part of personal fall arrest systems and positioning device systems is prohibited.

**Steep roof** means a roof having a slope greater than 4 in 12 (vertical to horizontal).

**Toeboard** means a low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

**Unprotected sides and edges** means any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches (1.0 m) high.

**Walking/working surface** means any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

**Warning line system** means a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without the use of guardrail, body belt, or safety net systems to protect employees in the area.

**Work area** means that portion of a walking/working surface where job duties are being performed.

[44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, as amended at 45 FR 75625, Nov. 14, 1980; 55 FR 47687, Nov. 14, 1990; 59 FR 40730, Aug. 9, 1994; 60 FR 5131, Jan. 26, 1995; 60 FR 39254, Aug. 2, 1995; 66 FR 5265, Jan. 18, 2001]

**Regulations (Standards - 29 CFR)**  
**Duty to have fall protection. - 1926.501**

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1926.501(a)

"General."

1926.501(a)(1)

This section sets forth requirements for employers to provide fall protection systems. All fall protection required by this section shall conform to the criteria set forth in 1926.502 of this subpart.

1926.501(a)(2)

The employer shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely. Employees shall be allowed to work on those surfaces only when the surfaces have the requisite strength and structural integrity.

1926.501(b)

1926.501(b)(1)

"Unprotected sides and edges." Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.

*..1926.501(b)(2)*

1926.501(b)(2)

"Leading edges."

1926.501(b)(2)(i)

Each employee who is constructing a leading edge 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with 1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

1926.501(b)(2)(ii)

Each employee on a walking/working surface 6 feet (1.8 m) or more above a lower level where leading edges are under construction, but who is not engaged in the leading edge work, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system. If a guardrail system is chosen to provide the fall protection, and a controlled

access zone has already been established for leading edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge.

**1926.501(b)(3)**

"Hoist areas." Each employee in a hoist area shall be protected from falling 6 feet (1.8 m) or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems, [or chain, gate, or guardrail] or portions thereof, are removed to facilitate the hoisting operation (e.g., during landing of materials), and an employee must lean through the access opening or out over the edge of the access opening (to receive or guide equipment and materials, for example), that employee shall be protected from fall hazards by a personal fall arrest system.

**..1926.501(b)(4)**

**1926.501(b)(4)**

"Holes."

**1926.501(b)(4)(i)**

Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than 6 feet (1.8 m) above lower levels, by personal fall arrest systems, covers, or guardrail systems erected around such holes.

**1926.501(b)(4)(ii)**

Each employee on a walking/working surface shall be protected from tripping in or stepping into or through holes (including skylights) by covers.

**1926.501(b)(4)(iii)**

Each employee on a walking/working surface shall be protected from objects falling through holes (including skylights) by covers.

**1926.501(b)(5)**

"Formwork and reinforcing steel." Each employee on the face of formwork or reinforcing steel shall be protected from falling 6 feet (1.8 m) or more to lower levels by personal fall arrest systems, safety net systems, or positioning device systems.

**1926.501(b)(6)**

"Ramps, runways, and other walkways." Each employee on ramps, runways, and other walkways shall be protected from falling 6 feet (1.8 m) or more to lower levels by guardrail systems.

**1926.501(b)(7)**

"Excavations."

**1926.501(b)(7)(i)**

Each employee at the edge of an excavation 6 feet (1.8 m) or more in depth shall be protected

from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier;

**..1926.501(b)(7)(ii)**

**1926.501(b)(7)(ii)**

Each employee at the edge of a well, pit, shaft, and similar excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

**1926.501(b)(8)**

"Dangerous equipment."

**1926.501(b)(8)(i)**

Each employee less than 6 feet (1.8 m) above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems or by equipment guards.

**1926.501(b)(8)(ii)**

Each employee 6 feet (1.8 m) or more above dangerous equipment shall be protected from fall hazards by guardrail systems, personal fall arrest systems, or safety net systems.

**1926.501(b)(9)**

"Overhand bricklaying and related work."

**1926.501(b)(9)(i)**

Except as otherwise provided in paragraph (b) of this section, each employee performing overhand bricklaying and related work 6 feet (1.8 m) or more above lower levels, shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or shall work in a controlled access zone.

**1926.501(b)(9)(ii)**

Each employee reaching more than 10 inches (25 cm) below the level of the walking/working surface on which they are working, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

Note: Bricklaying operations performed on scaffolds are regulated by subpart L - Scaffolds of this part.

**..1926.501(b)(10)**

**1926.501(b)(10)**

"Roofing work on Low-slope roofs." Except as otherwise provided in paragraph (b) of this section, each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system, or warning line system and safety

monitoring system. Or, on roofs 50-feet (15.25 m) or less in width (see Appendix A to subpart M of this part), the use of a safety monitoring system alone [i.e. without the warning line system] is permitted.

**1926.501(b)(11)**

"Steep roofs." Each employee on a steep roof with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety net systems, or personal fall arrest systems.

**1926.501(b)(12)**

"Precast concrete erection." Each employee engaged in the erection of precast concrete members (including, but not limited to the erection of wall panels, columns, beams, and floor and roof "tees") and related operations such as grouting of precast concrete members, who is 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems, unless another provision in paragraph (b) of this section provides for an alternative fall protection measure. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with 1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

**..1926.501(b)(13)**

**1926.501(b)(13)**

"Residential construction." Each employee engaged in residential construction activities 6 feet (1.8 m) or more above lower levels shall be protected by guardrail systems, safety net system, or personal fall arrest system unless another provision in paragraph (b) of this section provides for an alternative fall protection measure. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with 1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

**1926.501(b)(14)**

"Wall openings." Each employee working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is 6 feet (1.8 m) or more above lower levels and the inside bottom edge of the wall opening is less than 39

inches (1.0 m) above the walking/working surface, shall be protected from falling by the use of a guardrail system, a safety net system, or a personal fall arrest system.

1926.501(b)(15)

"Walking/working surfaces not otherwise addressed." Except as provided in 1926.500(a)(2) or in 1926.501 (b)(1) through (b)(14), each employee on a walking/working surface 6 feet (1.8 m) or more above lower levels shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

1926.501(c)

"Protection from falling objects." When an employee is exposed to falling objects, the employer shall have each employee wear a hard hat and shall implement one of the following measures:

1926.501(c)(1)

Erect toeboards, screens, or guardrail systems to prevent objects from falling from higher levels; or,

*..1926.501(c)(2)*

1926.501(c)(2)

Erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced; or,

1926.501(c)(3)

Barricade the area to which objects could fall, prohibit employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.

[59 FR 40732, Aug. 9, 1994; 60 FR 5131, Jan. 26, 1995]

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**Regulations (Standards - 29 CFR)**  
**Fall protection systems criteria and practices. - 1926.502**

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1926.502(a)

"General."

1926.502(a)(1)

Fall protection systems required by this part shall comply with the applicable provisions of this section.

1926.502(a)(2)

Employers shall provide and install all fall protection systems required by this subpart for an employee, and shall comply with all other pertinent requirements of this subpart before that employee begins the work that necessitates the fall protection.

1926.502(b)

"Guardrail systems." Guardrail systems and their use shall comply with the following provisions:

1926.502(b)(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.

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.

**..1926.502(b)(2)**

1926.502(b)(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.

1926.502(b)(2)(i)

Midrails, when used, shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.

1926.502(b)(2)(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.

1926.502(b)(2)(iii)

Intermediate members (such as balusters), when used between posts, shall be not more than 19 inches (48 cm) apart.

1926.502(b)(2)(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.

1926.502(b)(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.

**..1926.502(b)(4)**

1926.502(b)(4)

When the 200 pound (890 N) test load specified in paragraph (b)(3) of this section 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 subpart M of this part will be deemed to meet this requirement.

1926.502(b)(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.

1926.502(b)(6)

Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

1926.502(b)(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.

1926.502(b)(8)

Steel banding and plastic banding shall not be used as top rails or midrails.

1926.502(b)(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.

**..1926.502(b)(10)**

1926.502(b)(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.

1926.502(b)(11)

When guardrail systems are used at holes, they shall be erected on all unprotected sides or

edges of the hole.

1926.502(b)(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.

1926.502(b)(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.

1926.502(b)(14)

Guardrail systems used on ramps and runways shall be erected along each unprotected side or edge.

1926.502(b)(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)**

1926.502(c)

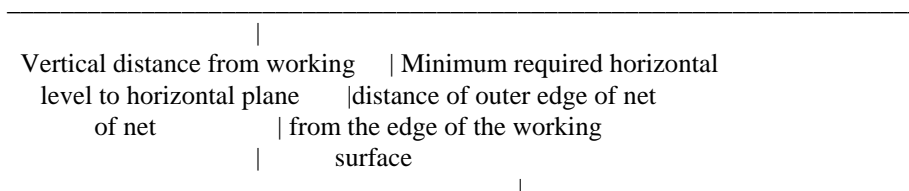
"Safety net systems." Safety net systems and their use shall comply with the following provisions:

1926.502(c)(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.

1926.502(c)(2)

Safety nets shall extend outward from the outermost projection of the work surface as follows:



Up to 5 feet ..... | 8 feet.  
More than 5 feet up to 10 feet ..... | 10 feet.

More than 10 feet ..... | 13 feet.

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**1926.502(c)(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 (c)(4) of this section.

**1926.502(c)(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(c)(4)(i)**

**1926.502(c)(4)(i)**

Except as provided in paragraph (c)(4)(ii) of this section, 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.

**1926.502(c)(4)(ii)**

When the employer can demonstrate that it is unreasonable to perform the drop-test required by paragraph (c)(4)(i) of this section, 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 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 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.

**1926.502(c)(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.

**..1926.502(c)(6)**

**1926.502(c)(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.

**1926.502(c)(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.

**1926.502(c)(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).

**1926.502(c)(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.

1926.502(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(d)(1)

Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

**..1926.502(d)(2)**

1926.502(d)(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.

1926.502(d)(3)

Dee-rings and snaphooks shall have a minimum tensile strength of 5,000 pounds (22.2 kN).

1926.502(d)(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.

1926.502(d)(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.

1926.502(d)(6)

Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:

1926.502(d)(6)(i)

directly to webbing, rope or wire rope;

1926.502(d)(6)(ii)

to each other;

**..1926.502(d)(6)(iii)**

1926.502(d)(6)(iii)

to a dee-ring to which another snaphook or other connector is attached;

1926.502(d)(6)(iv)

to a horizontal lifeline; or

1926.502(d)(6)(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.

1926.502(d)(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.

1926.502(d)(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.

1926.502(d)(9)

Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2 kN).

**..1926.502(d)(10)**

1926.502(d)(10)

1926.502(d)(10)(i)

Except as provided in paragraph (d)(10)(ii) of this section, when vertical lifelines are used, each employee shall be attached to a separate lifeline.

1926.502(d)(10)(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.

1926.502(d)(11)

Lifelines shall be protected against being cut or abraded.

1926.502(d)(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.

1926.502(d)(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.

**..1926.502(d)(14)**

1926.502(d)(14)

Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made from synthetic fibers.

1926.502(d)(15)

Anchorage 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:

1926.502(d)(15)(i)

as part of a complete personal fall arrest system which maintains a safety factor of at least two; and

1926.502(d)(15)(ii)

under the supervision of a qualified person.

1926.502(d)(16)

Personal fall arrest systems, when stopping a fall, shall:

1926.502(d)(16)(i)

limit maximum arresting force on an employee to 900 pounds (4 kN) when used with a body belt;

1926.502(d)(16)(ii)

limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness;

1926.502(d)(16)(iii)

be rigged such that an employee can neither free fall more than 6 feet (1.8 m), nor contact any lower level;

**..1926.502(d)(16)(iv)**

1926.502(d)(16)(iv)

bring an employee to a complete stop and limit maximum deceleration distance an employee

travels to 3.5 feet (1.07 m); and,

**1926.502(d)(16)(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 subpart M, 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. 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(d)(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.

**1926.502(d)(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.

**1926.502(d)(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.

**1926.502(d)(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.

**..1926.502(d)(21)**

**1926.502(d)(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.

**1926.502(d)(22)**

Body belts shall be at least one and five-eighths (1 5/8) inches (4.1 cm) wide.

**1926.502(d)(23)**

Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists except as specified in other subparts of this Part.

**1926.502(d)(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.

**1926.502(e)**

"Positioning device systems." Positioning device systems and their use shall conform to the following provisions:

**1926.502(e)(1)**

Positioning devices shall be rigged such that an employee cannot free fall more than 2 feet (.9 m).

**1926.502(e)(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.

**1926.502(e)(3)**

Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

**..1926.502(e)(4)**

1926.502(e)(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.

1926.502(e)(5)

Connecting assemblies shall have a minimum tensile strength of 5,000 pounds (22.2 kN)

1926.502(e)(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.

1926.502(e)(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.

1926.502(e)(8)

Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:

1926.502(e)(8)(i)

directly to webbing, rope or wire rope;

1926.502(e)(8)(ii)

to each other;

**..1926.502(e)(8)(iii)**

1926.502(e)(8)(iii)

to a dee-ring to which another snaphook or other connector is attached;

1926.502(e)(8)(iv)

to a horizontal lifeline; or

1926.502(e)(8)(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.

1926.502(e)(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.

1926.502(e)(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.

**1926.502(f)**

"Warning line systems." Warning line systems [See 1926.501(b)(10)] and their use shall comply with the following provisions:

**1926.502(f)(1)**

The warning line shall be erected around all sides of the roof work area.

**..1926.502(f)(1)(i)**

1926.502(f)(1)(i)

When mechanical equipment is not being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge.

1926.502(f)(1)(ii)

When mechanical equipment is being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge which is parallel to the direction of mechanical equipment operation, and not less than 10 feet (3.1 m) from the roof edge which is perpendicular to the

direction of mechanical equipment operation.

**1926.502(f)(1)(iii)**

Points of access, materials handling areas, storage areas, and hoisting areas shall be connected to the work area by an access path formed by two warning lines.

**1926.502(f)(1)(iv)**

When the path to a point of access is not in use, a rope, wire, chain, or other barricade, equivalent in strength and height to the warning line, shall be placed across the path at the point where the path intersects the warning line erected around the work area, or the path shall be offset such that a person cannot walk directly into the work area.

**1926.502(f)(2)**

Warning lines shall consist of ropes, wires, or chains, and supporting stanchions erected as follows:

**1926.502(f)(2)(i)**

The rope, wire, or chain shall be flagged at not more than 6-foot (1.8 m) intervals with high-visibility material;

**..1926.502(f)(2)(ii)**

**1926.502(f)(2)(ii)**

The rope, wire, or chain shall be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches (.9 m) from the walking/working surface and its highest point is no more than 39 inches (1.0 m) from the walking/working surface;

**1926.502(f)(2)(iii)**

After being erected, with the rope, wire, or chain attached, stanchions shall be capable of resisting, without tipping over, a force of at least 16 pounds (71 N) applied horizontally against the stanchion, 30 inches (.8 m) above the walking/working surface, perpendicular to the warning line, and in the direction of the floor, roof, or platform edge;

**1926.502(f)(2)(iv)**

The rope, wire, or chain shall have a minimum tensile strength of 500 pounds (2.22 kN), and after being attached to the stanchions, shall be capable of supporting, without breaking, the loads applied to the stanchions as prescribed in paragraph (f)(2)(iii) of this section; and

**1926.502(f)(2)(v)**

The line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.

**1926.502(f)(3)**

No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing roofing work in that area.

**..1926.502(f)(4)**

**1926.502(f)(4)**

Mechanical equipment on roofs shall be used or stored only in areas where employees are protected by a warning line system, guardrail system, or personal fall arrest system.

**1926.502(g)**

"Controlled access zones." Controlled access zones [See 1926.501(b)(9) and 1926.502(k)] and their use shall conform to the following provisions.

**1926.502(g)(1)**

When used to control access to areas where leading edge and other operations are taking place the controlled access zone shall be defined by a control line or by any other means that restricts access.

**1926.502(g)(1)(i)**

When control lines are used, they shall be erected not less than 6 feet (1.8 m) nor more than 25 feet (7.7 m) from the unprotected or leading edge, except when erecting precast concrete

members.

1926.502(g)(1)(ii)

When erecting precast concrete members, the control line shall be erected not less than 6 feet (1.8 m) nor more than 60 feet (18 m) or half the length of the member being erected, whichever is less, from the leading edge.

1926.502(g)(1)(iii)

The control line shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.

**..1926.502(g)(1)(iv)**

1926.502(g)(1)(iv)

The control line shall be connected on each side to a guardrail system or wall.

1926.502(g)(2)

When used to control access to areas where overhand bricklaying and related work are taking place:

1926.502(g)(2)(i)

The controlled access zone shall be defined by a control line erected not less than 10 feet (3.1 m) nor more than 15 feet (4.5 m) from the working edge.

1926.502(g)(2)(ii)

The control line shall extend for a distance sufficient for the controlled access zone to enclose all employees performing overhand bricklaying and related work at the working edge and shall be approximately parallel to the working edge.

1926.502(g)(2)(iii)

Additional control lines shall be erected at each end to enclose the controlled access zone.

1926.502(g)(2)(iv)

Only employees engaged in overhand bricklaying or related work shall be permitted in the controlled access zone.

1926.502(g)(3)

Control lines shall consist of ropes, wires, tapes, or equivalent materials, and supporting stanchions as follows:

1926.502(g)(3)(i)

Each line shall be flagged or otherwise clearly marked at not more than 6-foot (1.8 m) intervals with high-visibility material.

**..1926.502(g)(3)(ii)**

1926.502(g)(3)(ii)

Each line shall be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches (1 m) from the walking/working surface and its highest point is not more than 45 inches (1.3 m) [50 inches (1.3 m) when overhand bricklaying operations are being performed] from the walking/working surface.

1926.502(g)(3)(iii)

Each line shall have a minimum breaking strength of 200 pounds (.88 kN).

1926.502(g)(4)

On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, controlled access zones shall be enlarged, as necessary, to enclose all points of access, material handling areas, and storage areas.

1926.502(g)(5)

On floors and roofs where guardrail systems are in place, but need to be removed to allow overhand bricklaying work or leading edge work to take place, only that portion of the guardrail necessary to accomplish that day's work shall be removed.

1926.502(h)

"Safety monitoring systems." Safety monitoring systems [See 1926.501(b)(10) and

1926.502(k)] and their use shall comply with the following provisions:

1926.502(h)(1)

The employer shall designate a competent person to monitor the safety of other employees and the employer shall ensure that the safety monitor complies with the following requirements:

1926.502(h)(1)(i)

The safety monitor shall be competent to recognize fall hazards;

**..1926.502(h)(1)(ii)**

1926.502(h)(1)(ii)

The safety monitor shall warn the employee when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner;

1926.502(h)(1)(iii)

The safety monitor shall be on the same walking/working surface and within visual sighting distance of the employee being monitored;

1926.502(h)(1)(iv)

The safety monitor shall be close enough to communicate orally with the employee; and

1926.502(h)(1)(v)

The safety monitor shall not have other responsibilities which could take the monitor's attention from the monitoring function.

1926.502(h)(2)

Mechanical equipment shall not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs.

1926.502(h)(3)

No employee, other than an employee engaged in roofing work [on low-sloped roofs] or an employee covered by a fall protection plan, shall be allowed in an area where an employee is being protected by a safety monitoring system.

1926.502(h)(4)

Each employee working in a controlled access zone shall be directed to comply promptly with fall hazard warnings from safety monitors.

**..1926.502(i)**

1926.502(i)

"Covers." Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

1926.502(i)(1)

Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.

1926.502(i)(2)

All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.

1926.502(i)(3)

All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.

1926.502(i)(4)

All covers shall be color coded or they shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard.

Note: This provision does not apply to cast iron manhole covers or steel grates used on streets or roadways.

1926.502(j)

"Protection from falling objects." Falling object protection shall comply with the following

provisions:

1926.502(j)(1)

Toeboards, when used as falling object protection, shall be erected along the edge of the overhead walking/working surface for a distance sufficient to protect employees below.

**..1926.502(j)(2)**

1926.502(j)(2)

Toeboards shall be capable of withstanding, without failure, a force of at least 50 pounds (222 N) applied in any downward or outward direction at any point along the toeboard.

1926.502(j)(3)

Toeboards shall be a minimum of 3 1/2 inches (9 cm) in vertical height from their top edge to the level of the walking/working surface. They shall have not more than 1/4 inch (0.6 cm) clearance above the walking/working surface. They shall be solid or have openings not over 1 inch (2.5 cm) in greatest dimension.

1926.502(j)(4)

Where tools, equipment, or materials are piled higher than the top edge of a toeboard, paneling or screening shall be erected from the walking/working surface or toeboard to the top of a guardrail system's top rail or midrail, for a distance sufficient to protect employees below.

1926.502(j)(5)

Guardrail systems, when used as falling object protection, shall have all openings small enough to prevent passage of potential falling objects.

1926.502(j)(6)

During the performance of overhand bricklaying and related work:

1926.502(j)(6)(i)

No materials or equipment except masonry and mortar shall be stored within 4 feet (1.2 m) of the working edge.

**..1926.502(j)(6)(ii)**

1926.502(j)(6)(ii)

Excess mortar, broken or scattered masonry units, and all other materials and debris shall be kept clear from the work area by removal at regular intervals.

1926.502(j)(7)

During the performance of roofing work:

1926.502(j)(7)(i)

Materials and equipment shall not be stored within 6 feet (1.8 m) of a roof edge unless guardrails are erected at the edge.

1926.502(j)(7)(ii)

Materials which are piled, grouped, or stacked near a roof edge shall be stable and self-supporting.

1926.502(j)(8)

Canopies, when used as falling object protection, shall be strong enough to prevent collapse and to prevent penetration by any objects which may fall onto the canopy.

1926.502(k)

"Fall protection plan." This option is available only to employees engaged in leading edge work, precast concrete erection work, or residential construction work (See 1926.501(b)(2), (b)(12), and (b)(13)) who can demonstrate that it is infeasible or it creates a greater hazard to use conventional fall protection equipment. The fall protection plan must conform to the following provisions.

1926.502(k)(1)

The fall protection plan shall be prepared by a qualified person and developed specifically for the site where the leading edge work, precast concrete work, or residential construction

work is being performed and the plan must be maintained up to date.

**..1926.502(k)(2)**

1926.502(k)(2)

Any changes to the fall protection plan shall be approved by a qualified person.

1926.502(k)(3)

A copy of the fall protection plan with all approved changes shall be maintained at the job site.

1926.502(k)(4)

The implementation of the fall protection plan shall be under the supervision of a competent person.

1926.502(k)(5)

The fall protection plan shall document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety nets systems) are infeasible or why their use would create a greater hazard.

1926.502(k)(6)

The fall protection plan shall include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection from the conventional fall protection systems. For example, the employer shall discuss the extent to which scaffolds, ladders, or vehicle mounted work platforms can be used to provide a safer working surface and thereby reduce the hazard of falling.

1926.502(k)(7)

The fall protection plan shall identify each location where conventional fall protection methods cannot be used. These locations shall then be classified as controlled access zones and the employer must comply with the criteria in paragraph (g) of this section.

**..1926.502(k)(8)**

1926.502(k)(8)

Where no other alternative measure has been implemented, the employer shall implement a safety monitoring system in conformance with 1926.502(h).

1926.502(k)(9)

The fall protection plan must include a statement which provides the name or other method of identification for each employee who is designated to work in controlled access zones. No other employees may enter controlled access zones.

1926.502(k)(10)

In the event an employee falls, or some other related, serious incident occurs, (e.g., a near miss) the employer shall investigate the circumstances of the fall or other incident to determine if the fall protection plan needs to be changed (e.g. new practices, procedures, or training) and shall implement those changes to prevent similar types of falls or incidents. [44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, as amended at 45 FR 75626, Nov. 14, 1980; 55 FR 47687, Nov. 14, 1990; 59 FR 40733, Aug. 9, 1994; 60 FR 5131, Jan. 26, 1995]

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**Regulations (Standards - 29 CFR)**  
**Training requirements. - 1926.503**

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The following training provisions supplement and clarify the requirements of 1926.21 regarding the hazards addressed in subpart M of this part.

1926.503(a)

"Training Program."

1926.503(a)(1)

The employer shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.

1926.503(a)(2)

The employer shall assure that each employee has been trained, as necessary, by a competent person qualified in the following areas:

1926.503(a)(2)(i)

The nature of fall hazards in the work area;

1926.503(a)(2)(ii)

The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;

1926.503(a)(2)(iii)

The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used;

1926.503(a)(2)(iv)

The role of each employee in the safety monitoring system when this system is used;

**..1926.503(a)(2)(v)**

1926.503(a)(2)(v)

The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs;

1926.503(a)(2)(vi)

The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection; and

1926.503(a)(2)(vii)

The role of employees in fall protection plans;

1926.503(a)(2)(viii)

The standards contained in this subpart.

1926.503(b)

"Certification of training."

1926.503(b)(1)

The employer shall verify compliance with paragraph (a) of this section by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted by another employer or completed prior to the effective date of this section, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of actual training.

1926.503(b)(2)

The latest training certification shall be maintained.

**..1926.503(c)**

1926.503(c)

"Retraining." When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by paragraph (a) of this section, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

1926.503(c)(1)

Changes in the workplace render previous training obsolete; or

1926.503(c)(2)

Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or

1926.503(c)(3)

Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

Note: The following appendices to subpart M of this part serve as non-mandatory guidelines to assist employers in complying with the appropriate requirements of subpart M of this part.

[59 FR 40738, Aug. 9, 1994; 60 FR 5131, Jan. 26, 1995]