



Fall Prevention and Protection

Module Purpose

The purpose of this module is to provide an overview of safe work procedures around floor and wall coverings, guardrails, ladders, fall arrest systems, and other fall protective systems. Requirements for site-specific fall protection and training will be highlighted. Particular emphasis will be placed on bridgework, overpasses, and falls from equipment. Other topics include proper use of railings, toe boards, covers, platforms, ramps, and guardrails. Requirements set forth in this module can be found in OSHA's 29 CFR Part 1926, Subpart M, Fall Protection, 1926.500 – 503.

Time

60 minutes (1:20 - 2:20 p.m.)
(A 10-minute break follows this module)

Objectives

After completing this module, participants will be able to:

Show slides 10.1 – 10.2.



- Recognize the purpose of fall protection in controlling and eliminating fall hazards
- Identify common ways to prevent falls in roadway construction
- Recognize when fall protection is required
- Recognize the types of fall protection systems and practices for meeting the fall protection standard

Materials and Resources

PowerPoint Slides: Module 10
Activities: Appendix 10-A

Module 10: Fall Prevention and Protection

Instructional Strategy and Course Content

Facilitator Notes

Lecture



1. Do we really need fall protection programs and regulations? *Show Slide 10.3*



2. When do I begin my fall protection and prevention program? *Show slide 10.4.*



3. What areas do OSHA regulations cover? *Show Slides 10.5 – 10.13.*



Lesson

1. Do we really need fall protection programs and regulations?

In 1995, 1,048 construction workers died on the job, with 32%, or 335 of them, resulting from falls. Each year, falls consistently account for the greatest number of fatalities in the construction industry, and are always a major concern in other industries.

Events surrounding these types of incidents often involve a number of factors, including unstable working surfaces, misuse of fall protection equipment, and human error. Studies have shown that the use of guardrails, fall arrest systems, safety nets, covers, and travel restriction systems can prevent many deaths and injuries from falls.

2. When do I begin my fall protection and prevention program?

Preplanning is critical. Incidents involving falls are generally complex events frequently involving a variety of factors. Consequently, the standard for fall protection deals with both the human and equipment-related issues in protecting workers from fall hazards. For example, employers and employees need to do the following:

- Where protection is required, select fall protection systems appropriate for the situation
- Use proper construction and installation of safety systems
- Supervise employees properly
- Use safe work procedures
- Train workers in the proper selection, use, and maintenance of fall protection systems

3. What areas do OSHA regulations cover?

The OSHA rule identifies areas or activities where fall protection is needed. Examples include:

- Ramps
- Runways
- Excavations
- Hoist Areas
- Holes
- Formwork
- Reinforcing Steel
- Unprotected sides and edges

Facilitator Notes

4. What does OSHA require for fall prevention and protection? *Show Slide 10.14.*



5-6. What are some of the common ways to prevent falls in roadway construction? *Show slides 10.15 – 10.16.*



Lesson

- Bridge Work
- Other Walking / Working Surfaces

4. What does OSHA require for fall prevention and protection?

The rule sets a uniform threshold height of 6 feet (1.8 meters) for providing consistent protection. This means that construction employers must protect their employees from fall hazards and falling objects whenever an affected employee is 6 feet (1.8 meters) or more above a lower level. Protection also must be provided for construction workers who are exposed to the hazard of falling into dangerous equipment.

Under 29 CFR Subpart M, Fall Protection, 1926.501, employers must assess the workplace to determine if the walking or working surfaces on which employees are to work have the strength and structural integrity to safely support workers.

Employees are not permitted to work on those surfaces until it has been determined that the surfaces have the strength and structural integrity to support the workers.

Once employers have determined that the surface is safe for employees to work on, the employer must select one of the options listed for the work operation if a fall hazard is present. For example, if an employee is exposed to falling 6 feet (1.8 meters) or more from an unprotected side or edge, the employer must select a guardrail system, safety net system, or personal fall arrest system to protect the worker.

5. What are the most frequently cited serious violations of OSHA's General Fall Protection standards (Subpart M)?

- Failure to protect workers from falls of 6 feet or more off unprotected edges, e.g. floors and roofs. (1926.501(b)(1); (b)(10); and (b)(11))
- Failure to protect workers from falling into or through holes and openings in floors and walls. (1926.501(b)(4) and (b)(14))
- Failure to provide guardrails on runways and ramps where workers are exposed to falls of 6 feet or more to a lower level. (1926.501(b)(6))

6. What are some of the common ways to prevent falls in roadway construction?

- Determine if any of the work (even a small portion) can be performed at ground level, or if a crane can be used to lift assembled portions (e.g., sections of decking) into place, eliminating or reducing the number of workers exposed to falling.

- Tether or restrain the worker so he or she cannot reach the edge thereby eliminating the fall hazard.
- Consider the use of aerial lifts or elevated platforms to provide better working surfaces rather than walking on top plates or beams.
- Erect guardrail systems, warning lines, or control line systems to protect workers from falls off the edges of floors and roofs.
- Place covers over holes as soon as they are created if no work is being done at the hole.
- Use safety net systems, or personal fall arrest systems (body harness).

7. What types of fall protection systems does OSHA permit or require? *Show slides 10.17 – 10.29.*



7. What types of fall protection systems does OSHA permit or require?

Controlled Access Zones—1926.502(g) A controlled access zone is a work area designated and clearly marked in which certain types of work (such as (example) may take place without the use of conventional fall protection systems (guardrail, personal arrest or safety net) to protect the employees working in the zone.

Controlled access zones are used to keep out workers other than those authorized to enter work areas from which guardrails have been removed. Where there are no guardrails, (example) are the only workers allowed in controlled access zones.

Guardrail Systems—1926.501(502)(b) If the employer chooses to use guardrail systems to protect workers from falls, some of the requirements are:

- The top edge height of top-rails must be 42 inches (1.1 m), plus or minus 3 inches (8 cm)
- When mid-rails are used, they must be installed at a height midway between the top edge of the guardrail system and the walking/working level.
- When screens and mesh are used, they must extend from the top rail to the walking/working level and along the entire opening between top rail supports.
- Toeboards must be used along the edge

Excavations—1926.501(b)(7) Each employee at the edge of an excavation 6 ft (1.8 m) or more deep shall be protected from falling by guardrail systems, fences, barricades, or covers. Where walkways are

provided to permit employees to cross over excavations, guardrails are required on the walkway if the fall would be 6-ft (1.8 m) or more to the lower level.

Personal Fall Arrest Systems—1926.502(d) These consist of an anchorage, connectors, and a body harness, and may include a deceleration device, lifeline, or suitable combinations. If a personal fall arrest system is used for fall protection, it must do the following:

- Limit maximum arresting force on an employee to 1,800 lbs. (8 kN) when used with a body harness;
- Be rigged so that an employee can neither free fall more than 6 ft (1.8 m) nor contact any lower level;
- After the free-fall distance, the deceleration or shock absorbing component of the system must bring an employee to a complete stop within 3.5 additional feet (1.07 m);
- Have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 ft (1.8 m) or the free fall distance permitted by the system, whichever is less.

Several points should be remembered regarding fall restraint.

- As of December 31, 1997, body belts can no longer be used
- The system's D-ring attachment point for body harnesses shall be in the center of the employee's back near the shoulder level
- The system components must be inspected for damage and deterioration prior to each use. All components subjected to the impact loading forces of a free-fall must be immediately removed from service.

Formwork & Reinforcing Steel—1926.501(b)(5) For employees, while moving vertically and/or horizontally on the vertical face of rebar assemblies built in place, fall protection is not required when employees are moving. OSHA considers the multiple hand holds and footholds on rebar assemblies as providing similar protection as that provided by a fixed ladder. Consequently, no fall protection is necessary while moving point to point for heights below 24 ft (7.3 m).

An employee must be provided with fall protection when climbing or otherwise moving at a height more than 24-ft (7.3 m), the same as for fixed ladders.

Figure 10-1

Safety nets must extend outward from the outermost projection of the work surface as indicated in the chart below:

Vertical distance from working level to horizontal plane of net surface	Minimum required horizontal distance of outer edge of net from edge of working surface
Up to 5 feet (1.5 meters)	8 feet (2.4 meters)
More than 5 feet (1.5 meters)	10 feet (3 meters)
More than 10 feet (3 meters)	13 feet (3.9 meters)
Safety nets shall be capable of absorbing an impact force of a drop test consisting of a 400-pound (180 kilograms) bag of sand 30 inches (76 centimeters) in diameter dropped from the highest walking/working surface at which workers are exposed, but not from less than 42 inches (1.1 meters) above that level.	
Items that have fallen into safety nets including — but not restricted to, materials, scrap, equipment, and tools — must be removed as soon as possible and at least before the next work shift.	

Facilitator Notes

Fall protection and prevention systems continued. Show slide 10.30.



8. What type of training does OSHA require?
Show slides 10.31 – 10.32



Lesson

Safety Net Systems—1926.502(c) Safety nets must be installed as close as practicable under the walking/working surface on which employees are working, and never more than 30-ft (9.1 m) below such levels. Safety nets must be inspected at least once a week for wear, damage, and other deterioration. The maximum size of each safety net mesh opening cannot exceed 36 square inches (230 square centimeters) nor be longer than 6 inches (15 centimeters) on any side, and the openings, measured center-to-center, of mesh ropes or webbing, cannot exceed 6 inches (15 centimeters).

All mesh crossings must be secured to prevent enlargement of the mesh opening. Each safety net or section must have a border rope for webbing with a minimum breaking strength of 5,000 lbs. (22.2 kN). Connections between safety net panels must be as strong as integral net components and be spaced no more than 6 inches (15 centimeters) apart. Safety nets must be installed with sufficient clearance underneath to prevent contact with the surface or structure below.

When nets are used on bridges, the potential fall area from the walking/working surface to the net must be free from obstructions.

8. What type of training does OSHA require?
28 CFR 1926.503 states that employers must provide a training program that teaches employees who might be exposed to fall hazards how to recognize such hazards and how to minimize them.

Facilitator Notes

Lesson

Workers must be trained in the following areas:

- The nature of fall hazards in the work area
- The correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems
- The use and operation of controlled access zones and guard-rail, personal fall arrest, safety net, warning line, and safety monitoring systems
- The role of each employee in the safety monitoring system when the system is in use
- The limitations on the use of mechanical equipment during the performance of roofing work on low-slope roofs
- The correct procedures for equipment and materials handling and storage and the erection of overhead protection
- Employees' role in fall protection plans
- The standards in this Subpart.

A Competent Person must conduct training.

Employers must prepare a written certification that identifies the employee trained and the date of the training. The employer or trainer must sign the certification record.

Retraining also must be provided when necessary.

Activity



9. Identify the hazards in the video clip. *Slides 10.33 – 10.34; see Appendix 10-A*

10. Elicit additional questions and summarize. Slide 10.35

11. Transition to prepare participants for Module 11.



9. Activity — *Identify the Hazard*

Identify the hazards in the video clip. Appendix 10-A.

10. Question and summary period.

11. Transition to Module 11.

Identify the Hazards – Falls

Objective: This short activity will allow participants to view a brief video clip and the list the hazards that they have observed in the clip. It is designed to serve as a bridge for the instructor to involve class members in a discussion about the proper use of fall prevention and protection.

Materials:

- Power Point Slides 10.33 & 1-.44 (Double click the image to begin video.) The Instructor may want to play the clip several times to allow students to watch it carefully.

Time: 5 minutes

Activity: Instruct the students that they are to watch the video clip and identify all the hazards that they observe, writing them on a piece of paper. (You may also ask them to identify safety practices as well.) After reviewing the clip, ask students to share their observations with the class.

Important points to identify are:

- Failure to use a full safety harness (actor is wearing a belt)
- Failing to tie off
- Caution on tie-off points to not compromise the strength of the system
- Some workers are using 100% protection