



Electrical Transmission & Distribution Partnership

Continuing Education Training **Fall Protection**

Presenter Guide

4th Quarter 2021

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Introduction

This Fall Protection Refresher course is a presenter lead (supervisor, safety professional) process. The presenter may choose to augment the material with videos, handouts or other media to enhance the learning experience. The presenter may want to incorporate visual aids to enhance the presentation.

Using this material in combination with practical experience, good presentation skills and knowledge of adult learning techniques, the presenter has a greater opportunity to deliver the information.

Edgar Dale stated that 2 weeks after a learning event, adult learners remember:

- 10% of what they read
- 20% of what they hear
- 30% of what they see
- 50% of what they see and hear 70% of what they say
- 90% of what they say while performing a task

Microsoft® PowerPoint® combined with good instructional skills and instructor/student dialogue work strongly in the fifty to seventy percent range. PowerPoint® presents the information to the attendee and the instructor summarizes the content of the slides. It is critical to engage and involve the attendee in the process. Ask open-ended questions that will elicit conversation and discussion but be cautious to maintain control of the discussion.

Conversation and scenarios are good but can cause the discussion to run long. If it seems like the group is losing focus during the course, the presenter can direct the group back on track by using comments like “Good discussion, but let’s get back to the subject at hand”.

Another tool is the “Parking Lot” which is simply a newsprint chart or dry erase board or note pad where the presenter records questions/discussion points not answered or addressed during the meeting and that may require more research. It is vital to capture any ongoing discussions or questions on the “Parking Lot” and follow up when the information is known.

Deliver this refresher during the fourth quarter of 2021. Delivery time is approximately 45 minutes to 1 hour, in one setting or divided-up into two, 20-25 minute settings. The presenter may deliver the topic in a formalized meeting room setting using the PowerPoint slide deck or by using the three, key point sheets (located at the end of each session) as in a tailgate safety talk. It is critical that the facilitator makes him or herself familiar with the material prior to delivery.

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Slide 1



Introduce the module. Explain to the group that this module will discuss some general fall protection requirements and requirements for employees engaged in power transmission and distribution work.

Slide 2

Objectives

Upon completion of this module you should be able to:

- ☑ Understand the Best Practice – Safety At Heights and know where to find it.
- ☑ Describe at least three methods of protecting electrical workers from falls
- ☑ Explain the difference between the various systems
- ☑ Explain requirements to use fall protection
- ☑ Explain equipment inspection requirements
- ☑ Explain how to calculate fall distance
- ☑ Explain anchorage and training requirements

PARTNERSHIP

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This module is not intended to cover every aspect of fall protection. It is designed to cover the more basic aspects for overhead electrical work. Please note that your specific company and client rules may be more stringent than those talked about here. Upon completion of this module you should be able to determine when fall protection is needed; what is needed; how to inspect, use and care for this equipment.

Slide 3

ET&D Best Practice (Safety at Heights)

The Partnership is committed to the practice of Safety at Heights wherever the potential exists for personnel falling from heights.

This Best Practice:

- Addresses fall hazards associated with, but not limited to aerial tasks performed on wood/steel poles and metal/lattice structures.
- Uses the Hierarchy of Controls to eliminate or control fall hazards.

Hierarchy of Controls

Control Level	Description
Elimination	Physically remove the hazard
Substitution	Replace the hazard
Engineering Controls	Isolate people from the hazard
Administrative Controls	Change the way people work
PPE	Protect the worker with Personal Protective Equipment

Most effective
Least effective

PARTNERSHIP

3

Explain the two bullets as being why the best practice was created and go over how to use the Hierarchy of Controls to decide what actions to take when recognizing a hazard or exposure. How we want to look to eliminate hazards first, if we can't then substitute, etc... We always want to try to stay in the upper half of the controls and not venture into Administrative Controls and PPE to resolve all hazards.

Slide 4

Employer's Duty

The employer shall ensure that employees use fall protection systems as follows:

- Each employee working from an aerial lift shall use a fall restraint system or a personal fall arrest system
- Each employee more than 4 feet above the ground on poles, towers, or similar structures shall use a personal fall arrest system, work-positioning equipment, or fall restraint system

PARTNERSHIP

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Explain that this is a change to the Subpart V standard.

1926.954(b)(3)(iii): The employer shall ensure that employees use fall protection systems as follows:

1926.954(b)(3)(iii)(A): Each employee working from an aerial lift shall use a fall restraint system or a personal fall arrest system. Paragraph (b)(2)(v) of § 1926.453 does not apply.

1926.954(b)(3)(iii)(B): Except as provided in paragraph (b)(3)(iii)(C) of this section, each employee in elevated locations more than 1.2 meters (4 feet) above the ground on poles, towers, or similar structures shall use a personal fall arrest system, work-positioning equipment, or fall restraint system, as appropriate, if the employer has not provided other fall protection meeting Subpart M of this part.

1926.954(b)(3)(iii)(C): Until March 31, 2015, a qualified employee climbing or changing location on poles, towers, or similar structures need not use fall protection equipment, unless conditions, such as, but not limited to, ice, high winds, the design of the structure (for example, no provision for holding on with hands), or the presence of contaminants on the structure, could cause the employee to lose his or her grip or footing. On and after April 1, 2015, each qualified employee climbing or changing location on poles, towers, or similar structures unless the employer can demonstrate that climbing or changing location with fall protection is infeasible or creates a greater hazard than climbing or changing location without it.

Slide 5



Employer's Duty

- Determine if the surfaces on which its employees are to work have the strength and structural integrity to support employees safely
- Ensure employees are trained in the use, care and inspection of equipment/systems.



Partnership

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Explain that the employer is responsible to ensure that his or her employees only walk and work on surfaces that will support them.

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.

Subpart M requires that the employer must provide fall protection when there is a hazard of falling 6 feet or more to a lower level. This can include wall openings that are less than 39 inches from the floor that have a fall hazard of 6 feet or more to a lower level. An example of this would be a building under construction that has a rough window opening in place.

Slide 6



Change

Fall protection and fall arrest is now required by the OSHA standards



PARTNERSHIP

6

Explain the requirements of the OSHA standards.

1926.954(b)(3)(iii)(B): Except as provided in paragraph (b)(3)(iii)(C) of this section, each employee in elevated locations more than 1.2 meters (4 feet) above the ground on poles, towers, or similar structures shall use a personal fall arrest system, work-positioning equipment, or fall restraint system, as appropriate, if the employer has not provided other fall protection meeting Subpart M of this part.

1926.954(b)(3)(iii)(C): Until March 31, 2015, a qualified employee climbing or changing location on poles, towers, or similar structures need not use fall protection equipment, unless conditions, such as, but not limited to, ice, high winds, the design of the structure (for example, no provision for holding on with hands), or the presence of contaminants on the structure, could cause the employee to lose his or her grip or footing. On and after April 1, 2015, each qualified employee climbing or changing location on poles, towers, or similar structures unless the employer can demonstrate that climbing or changing location with fall protection is infeasible or creates a greater hazard than climbing or changing location without it.

Note 1 to paragraphs (b)(3)(iii)(B) and (b)(3)(iii)(C): These paragraphs apply to structures that support overhead electric power transmission and distribution lines and equipment. They do not apply to portions of buildings, such as loading docks, or to electric equipment, such as transformers and capacitors. Subpart M of this part contains the duty to provide fall protection associated with walking and working surfaces.

Note 2 to paragraphs (b)(3)(iii)(B) and (b)(3)(iii)(C): Until the employer ensures that employees are proficient in climbing and the use of fall protection under §1926.950(b)(7), the employees are not considered "qualified employees" for the purposes of paragraphs (b)(3)(iii)(B) and (b)(3)(iii)(C) of this section. These paragraphs require unqualified employees (including trainees) to use fall protection any time they are more than 1.2 meters (4 feet) above the ground.

1926.954(b)(3)(iv): On and after April 1, 2015, Work-positioning systems shall be rigged so that an employee can free fall no more than 0.6 meters (2 feet).

1926.954(b)(3)(v): Anchorages for work-positioning equipment shall be capable of supporting at least twice the potential impact load of an employee's fall, or 13.3 kilo-newtons (3,000 pounds-force), whichever is greater.

Note to paragraph (b)(3)(v): Wood-pole fall-restriction devices meeting American Society of Testing and Materials Standard Specifications for Personal Climbing Equipment, ASTM F887-12e1, are deemed to meet the anchorage-strength requirement when they are used in accordance with manufacturers' instructions.

Slide 7



Pole Climbing



Wood pole climbing
Fall-Arrest systems



7

Explain that 100% fall arrest devices are now mandated by federal law. It has long been recognized that falls from wooden poles is a causal factor for injury among power transmission and distribution workers. Many advances have been made to these systems since their inception. They are now less cumbersome to use and more user friendly. The bottom line is that when used, they will prevent falls from wooden poles.

Slide 8



Tower Climbing

Qualified employee climbing or changing location on poles, towers, or similar structures

- Must be protected from falls





8

Explain that on and after April 1, 2015, each qualified employee climbing or changing location on poles, towers, or similar structures unless the employer can demonstrate that climbing or changing location with fall protection is infeasible or creates a greater hazard than climbing or changing location without it

Slide 9



Qualified Employee

Until the employer ensures that employees are proficient in climbing and the use of fall protection the employees are not considered qualified employees





PARTNERSHIP

9

Explain that until the employer ensures that employees are proficient in climbing and the use of fall protection under §1926.950(b)(7), the employees are not considered "qualified employees" for the purposes of paragraphs (b)(3)(iii)(B) and (b)(3)(iii)(C) of this section. These paragraphs require unqualified employees (including trainees) to use fall protection any time they are more than 1.2 meters (4 feet) above the ground.

Slide 10



Types of Systems

- Fall Protection System
- Fall Arrest Systems
- Positioning System



Note: *Performance criteria is different for each*



PARTNERSHIP

10

Explain that this module will discuss the three basic systems and the differences between them. Fall protection can be guardrails, a controlled access zone, or a safety monitor etc. The intent is to prevent the fall. Fall arrest and positioning systems do not prevent falls they prevent the climber from being severely injured from the fall. They do this by limiting the fall distance and limiting the arresting forces placed on the climber. A fall arrest system is a set of devices that work to together to limit the arresting force to the body if a fall occurs.

Slide 11



Explain that the following section will discuss inspection criteria for various types of equipment.

Slide 12

General

- Inspect prior to use and during use in accordance with the manufacturer's instructions and guidelines
- Done by a competent person
- Defective or damaged equipment removed from service and tagged
- This includes equipment subjected to fall event

PARTNERSHIP

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Explain that all protective equipment must be inspected prior to use.

1926.954(b)(3): Care and use of personal fall protection equipment.

1926.954(b)(3)(i): Work-positioning equipment shall be inspected before use each day to determine that the equipment is in safe working condition. Work-positioning equipment that is not in safe working condition may not be used.

Slide 13



Body Belt

- The hardware has no cracks, nicks, distortion, or corrosion
- No loose or worn rivets are present
- The waist strap has no loose grommets
- The fastening straps are not 100-percent leather
- No worn materials that could affect the safety of the user are present



13

The following specific items of the worker's body belt shall be inspected to determine that: hardware has no cracks, distortion or corrosion; no loose or worn rivets are present; waist strap has no loose grommets; no worn materials that could affect the safety of the user are present; d-rings are compatible with the snap hooks which they are used; and no non-approved modifications have been made to carry tools or materials. Not all d-rings are compatible with all snap hooks. This is why it is important that equipment from the same manufacturer is used. The incompatibility may cause roll-out or unintentional disengagement of the snap hook from the d-ring.

Slide 14



Positioning Strap

- A dielectric test of 25,000 volts per foot for 3 minutes without visible deterioration
- A leakage test of 3,000 volts per foot with a leakage current of no more than 1 mA
- Tension tests of 4,500 pounds-force for sections free of buckle holes and 3,500 pounds-force for sections with buckle holes



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the following tests:

1926.954(b)(2)(vii)(A): A dielectric test of 819.7 volts, AC, per centimeter (25,000 volts per foot) for 3 minutes without visible deterioration;

1926.954(b)(2)(vii)(B): A leakage test of 98.4 volts, AC, per centimeter (3,000 volts per foot) with a leakage current of no more than 1 mA;

Note to paragraphs (b)(2)(vii)(A) and (b)(2)(vii)(B): Positioning straps that pass direct-current tests at equivalent voltages are considered as meeting this requirement.

1926.954(b)(2)(vii)(C): Tension tests of 20 kilo newtons (4,500 pounds-force) for sections free of buckle holes and of 15 kilo newtons (3,500 pounds-force) for sections with buckle holes

Slide 15



Positioning Strap

A buckle-tear test with a load of 1,000 pounds-force

- A flammability test



PARTNERSHIP

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1926.954(b)(2)(vii)(D): A buckle-tear test with a load of 4.4 kilo newtons (1,000 pounds-force); and

1926.954(b)(2)(vii)(E): A flammability test in accordance with Table V-1.

Slide 16



Body Harness

- Manufacturer's markings
- Missing pieces
- Defects or damage
- Alteration
- UV exposure
- Chemical exposure
- Frayed webbing



PARTNERSHIP

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The following specific items of the harness shall be inspected to determine:

- ✓ Absence or illegibility of manufacturer's markings;
- ✓ Absence of any elements affecting the equipment
- ✓ Form, fit or function;
- ✓ Evidence of defects or damage to hardware elements including:
 - cracks,
 - sharp edges,
 - deformation,
 - corrosion,
 - chemical attack,
 - excessive heating,
 - alteration and excessive wear;
- ✓ Evidence of defects or damage to straps or ropes including:
 - fraying,
 - misplacing,
 - inlaying,
 - kinking,
 - knotting,
 - broken or pulled stitches,
 - excessive elongation,
 - chemical attack,
 - excessive soiling,
 - abrasion,
 - alteration,
 - needed or excessive lubrication,
 - excessive aging and excessive wear;
 - alteration, or absence of parts,
 - evidence of defects in, damage to or improper function of mechanical devices and connectors.

Slide 17



Explain that the harnesses must have the d-ring in the center of the back near the shoulders. The harness and lanyard combination must limit the arresting force to 1800 lbs.

Slide 18



Flammability

Employees who are exposed to hazards from flames or electric arcs

- Harness must withstand a drop test after exposure to electric arc with a heat energy of $40 \pm 5 \text{ cal/cm}^2$



PARTNERSHIP

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Explain that harnesses worn by employees that may be exposed to the heat generated by flames or electrical arcs must meet certain performance criteria.

1926.954(b)(1)(ii): Personal fall arrest equipment used by employees who are exposed to hazards from flames or electric arcs, as determined by the employer under § 1926.960(g)(1), shall be capable of passing a drop test equivalent to that required by paragraph (b)(2)(xii) of this section after exposure to an electric arc with a heat energy of $40 \pm 5 \text{ cal/cm}^2$

Slide 19



Damaged/Defective Equipment

- Remove from Service immediately
- Tag
- Do Not Use until repaired
- If repairs cannot be made, destroy the device



PARTNERSHIP 19

Photo shows damaged fall protection equipment tagged out of service. End user or contractor is not authorized to make repairs. Equipment must be returned to manufacturer.

Slide 20



Shock Absorbing Lanyards/Harness

- Personal fall arrest systems and components subjected to impact loading SHALL be immediately removed from service
- Shall not be used again for employee protection until inspected and determined by a **competent person** to be undamaged and suitable for reuse.



Note: Even if the harness does not visually look damaged and/or the lanyard does not fully deploy

PARTNERSHIP 20

This photo shows what happens to a shock absorbing lanyard after a fall. This lanyard CANNOT be reused.

Slide 21



Explain that you are going to discuss the various types of systems.

Slide 22

Guardrails

Top rail

- 42 inches $\pm$ 3 inches
- Withstand 200 pound side force

Mid rail

- Mid-way between top rail and walking surface
- Withstand 150 pound force

22

Explain that 1926.502(b)(1) states: Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches (1.1 m) plus or minus 3 inches (8 cm) above the walking/working level. When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria of this paragraph.

1926.502(b)(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.

Slide 23



Open Excavation Protection System. OEPS™ is an industry derived safety device preventing fall related injuries and protecting staff, employers and visitors from danger and loss. OEPS™ which stands for Open Excavation Protection System, is a certified, made for industry barricade that completely secures the area around an excavation site whether excavating holes or trenches. It is an engineered safeguard that offers complete demarcation as well as a physical prevention of a fall event for staff, other workers, members of the public and animals. OEPS™ complements existing barricade protection perfectly. While excavation works take place, it operates alongside other on-site demarcation and barricading, such as demarcation exclusion zones. The OEPS™ is designed to offer ease of assembly and two-fold protection. Mesh floor panels allow over-the-excavation inspection/protection, while handrails prevent falls from the side. The system comprises of rigid panels and split floor panels that can be removed and secured away from the unit when in use, allowing access for tools for excavation. The panels are detachable and fold away. While forming a solid, rigid system, the individual components can be packed separately in a flat-pack configuration and stacked up to 6 units high. Each unit can be lifted by two adults.

Slide 24



OEPS-Fall Protection

Employees exposed to an auger shaft greater than 6 feet in depth and 30 inches in diameter should consider a Personal Fall Arrest System (PFAS) and a perimeter system for fall protection as deemed appropriate through the job briefing process.



Open Excavation Protection System

PARTNERSHIP

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Example pictured:

- A full body harness
- Self-retracting lanyard (SRL)
- Anchor plate
- Anchor block
- Guard rail system

Slide 25



OEPS-Fall Protection

- Unmanned drilled shaft openings shall be adequately protected by the use of hole covers.
- Must ensure that the item used for the hole, covers the open hole completely.
- The word "hole" must be marked on the top of the cover.



Open Excavation Protection System

PARTNERSHIP

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Construction mats, wire spool ends, steel road plate maybe used for this method fall protection.

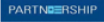
Slide 26



Concrete Forms and Rebar

- Use personal fall protection or positioning
- Cover or cap protruding rebar/conduit



26

Reference 1926.452(g) and 1926.701(b)

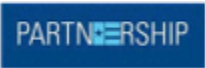
Employees on a form scaffold can be exposed to falls of less than 10 feet.

1926.501, covers employees working on whalers.

Slide 27



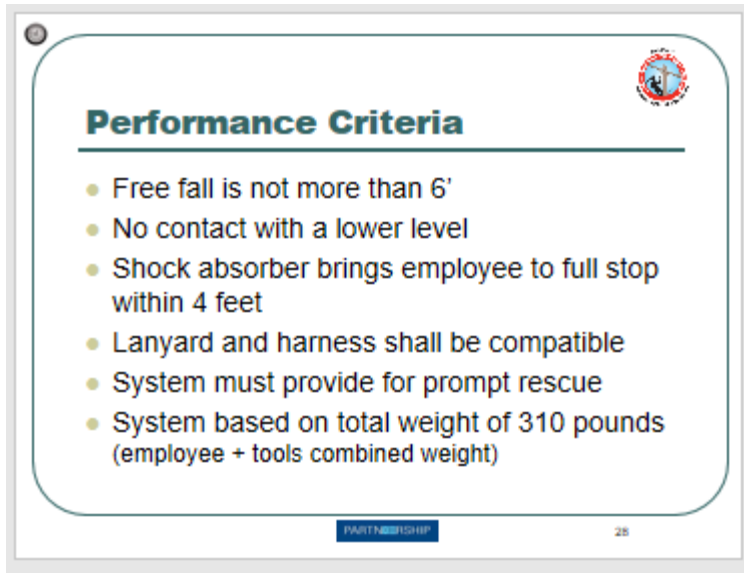
Fall Arrest Systems



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Explain that the following section will talk about the different types of systems.

Slide 28



Performance Criteria

- Free fall is not more than 6'
- No contact with a lower level
- Shock absorber brings employee to full stop within 4 feet
- Lanyard and harness shall be compatible
- System must provide for prompt rescue
- System based on total weight of 310 pounds (employee + tools combined weight)

PARTNERSHIP 28

Explain the performance criteria for fall protection equipment.

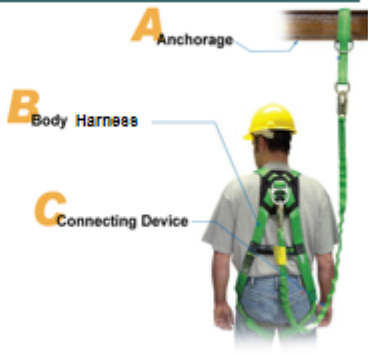
1926.502(d)(16)(v): have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1.8 m), or the free fall distance permitted by the system, whichever is less.

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

Slide 29

Fall Arrest System

- **A**nchorage
- **B**ody Harness
- **C**onnecting device
 - Shock absorbing lanyard
 - Beam strap



The diagram illustrates a fall arrest system. A worker wearing a yellow hard hat and a green body harness is shown from the back. A green lanyard with a shock absorber is attached to the harness and extends upwards to a horizontal metal beam, which is labeled 'A Anchorage'. The harness is labeled 'B Body Harness' and the lanyard is labeled 'C Connecting Device'.

29

Explain the A, B, C's of fall protection equipment.

Slide 30

Anchorage

- Support at least 5,000# per employee attached
- Positioning; 3,000# or twice impact load
- Manufacturer supplied devices
- Structural members of sufficient strength



The images show four different types of anchorage points. Top left: A rope grab attached to a cable. Top right: A snap hook attached to a metal beam. Bottom left: A D-ring attached to a metal plate. Bottom right: A snap hook attached to a metal bracket.

30

Discuss that the anchorage must be able to support at least 5,000 pounds per employee attached. Anchorages for positioning devices shall be able to support 3,000 pounds or two times the impact load. Anchorages on our bucket trucks must be independent of the bucket. Always attach to a manufacturer supplied anchor point. This point was engineered for use in accordance with ANSI A92.2 Vehicle-Mounted Elevating and Rotating Aerial Devices. If there is no supplied anchor point, then an approved boom strap must be used.

Review:

- An anchor utilized where the line passes over or around rough or sharp surfaces should be avoided or padded/protected.
- Horizontal lifeline systems may, depending on their geometry and angle of sag, be subjected to greater loads than the impact load imposed by the attached equip.
- The potential free fall distance when using a PFAS shall not exceed 6ft.
- The location of the anchor point should also consider the hazards of obstructions in the potential path of a climber. Also consider swing.

Slide 31



Horizontal Lifeline

- Minimum Safety factor of "2"
- Protected from being cut or abraded
- Designed, installed, and used under the supervision of a qualified person

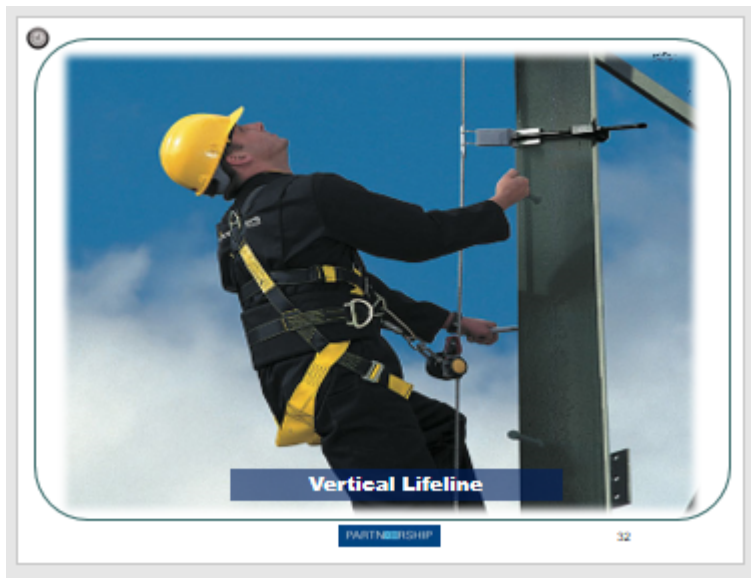


31

Explain that in the context to this standard, a Qualified Person means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

The specific requirements for HLL's in Part 1926.502(d)(8) state: "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."

Slide 32



1926.502(d)(9) states that lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2 kN).

Slide 33

Aerial Lifts

Each employee working from an aerial lift shall use:

- A fall restraint system or
- A personal fall arrest system

The slide includes a photograph of a worker in a yellow hard hat and safety harness working from an aerial lift. A red circle highlights the worker's fall restraint system. The slide is numbered 33 in the bottom right corner.

Explain that the requirement is that workers should not be in a position that they may be ejected from the aerial lift. The picture in the slide shows a worker wearing a self-retracting lifeline. Ask the group “Is this ok?”

1926.954(b)(3)(iii)(A): Each employee working from an aerial lift shall use a fall restraint system or a personal fall arrest system. Paragraph (b)(2)(v) of § 1926.453 does not apply.

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Aerial Lift Requirements

- Only authorized persons shall operate an aerial lift
- Belting off to an adjacent pole, structure, shall not be permitted
- Employees shall always stand firmly on the floor of the basket
- Not sit or climb on the edge of the basket
- Not use planks, ladders, or other devices for a work position



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Belting off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted. The following pages are a letter of interpretation regarding climbing out of elevated aerial lifts to gain access to a work location.

Slide 35



Shock Absorbing Lanyard

Minimum breaking strength of 5,000#

- Must have locking snap hooks



What's wrong with the yellow lanyard?

PARTNERSHIP

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Ask the group to state any problems they see. The yellow lanyard has a knot in it.

1926.502(d)(9): Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2 kN).

Slide 36



Tie Back

Only for lanyards designed to be used in a "Tie-Back" configuration



PARTNERSHIP

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Explain that only those lanyards that are designed to accommodate a tie back connection may be used in that configuration. Tie back lanyards generally do not allow the snap hook to connect over the webbing but to an additional D ring attached to the body of the lanyard.

Slide 37



Positioning Systems



PARTNERSHIP

37

The following section will discuss performance criteria for various types of positioning systems.

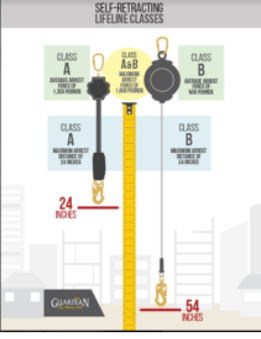
Slide 38



Self Retracting Lifeline

Limit Free Fall

- Two Classes:
 - Class A: 24-in.
 - Class B: 54-in.
- Minimum breaking strength of 3,000#
- Maximum Arrest Force of 1,800#



PARTNERSHIP

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When using a self-retracting lifeline, know your class of retractable being used. It must not allow any more than a 24 in or 54 in free fall. The minimum breaking strength of a self-retracting lifeline is 3,000 pounds. Maximum arrest force of 1,800#

Slide 39



Wooden Pole

Limits free-fall to Two (2) feet

- Minimum breaking strength of 3,000#.



PARTNERSHIP

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Explain that wood-pole fall-restriction devices meeting American Society of Testing and Materials Standard Specifications for Personal Climbing Equipment, ASTM F887-12e1, are deemed to meet the anchorage-strength requirement when they are used in accordance with manufacturers' instructions.

1926.954(b)(3)(iii)(B): Except as provided in paragraph (b)(3)(iii)(C) of this section, each employee in elevated locations more than 1.2 meters (4 feet) above the ground on poles, towers, or similar structures shall use a personal fall arrest system, work-positioning equipment, or fall restraint system, as appropriate, if the employer has not provided other fall protection meeting Subpart M of this part.

Slide 40



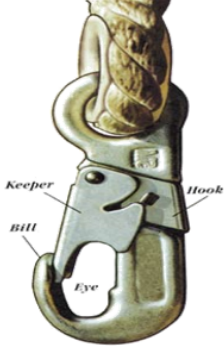
The following section will discuss performance criteria for various types of hardware.

Slide 41



Hardware

- Connectors
 - 5,000#
- D-rings
 - 5,000#; proof tested to 3,600#
- Snap hooks
 - 5,000#; proof tested to 3,600#
 - Locking type snap hook



PARTNERSHIP

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1926.954(b)(3)(vi): Unless the snap hook is a locking type and designed specifically for the following connections, snap hooks on work-positioning equipment may not be engaged:

1926.954(b)(3)(vi)(A): Directly to webbing, rope, or wire rope;

1926.954(b)(3)(vi)(B): To each other;

1926.954(b)(3)(vi)(C): To a D ring to which another snap hook or other connector is attached;

1926.954(b)(3)(vi)(D): To a horizontal lifeline; or

1926.954(b)(3)(vi)(E): To any object that is incompatibly shaped or dimensioned in relation to the snap hook such that accidental disengagement could occur should the connected object sufficiently depress the snap hook keeper to allow release of the object.

Hardware must be capable of supporting 5000 pounds. After January 1, 1998 snap hooks must be of the locking type.

Slide 42



The following section will discuss performance criteria for various types of equipment.

Slide 43

Fall Systems

- Fall Prevention System
 - Guardrails-No fall
- Personal Fall Arrest System
 - Limit free fall to 6'
- Positioning system
 - Free fall < 2 feet

Is this cross member sufficient to support the worker in a fall?

A personal fall arrest system is an assembly of equipment such as a full-body harness in conjunction with a connecting means, with or without an energy-absorbing device, and an anchorage to limit the forces a worker experiences during a fall. A fall arrest system is designed to prevent a worker, in the process of a fall, from falling more than the designed fall limit. It does not prevent a worker from falling.

A fall prevention system is a system, which may include a positioning system, intended to prevent a worker from falling from an elevation. Such systems include positioning device systems, guardrail, barriers, and restraint systems. Fall prevention systems are used in an attempt to prevent workers from falling from an elevation.

1926.954(b)(3)(iv): On and after April 1, 2015, Work-positioning systems shall be rigged so that an employee can free fall no more than 0.6 meters (2 feet).

Slide 44



Body Harness

Limit arresting force to 1800 pounds

- Lanyard must have shock absorber
- Add a Shock absorber
 - Limits force to 900 lbs.



PARTNERSHIP

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The harnesses must have the d-ring in the center of the back near the shoulders. The harness and lanyard combination must limit the arresting force to 1,800 lbs. Explain the need to use the buddy system to inspect each-others equipment to ensure it is worn correctly.

Slide 45



Fall Clearance Distance

- To ensure an employee does not strike a lower level – 12.5 to 19.5 feet of clearance distance is typically needed
- OSHA does not consider trees, conductor, the tower leg, cross bracing, or lattice work to be a lower level
- This is critical when considering fall arrest and fall positioning equipment

PARTNERSHIP

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The following is an excerpt from Exhibit A in the EEI settlement with OSHA.

Question (a):

Does OSHA consider a tree branch or a utility line conductor or cable to be a “lower level” for purposes of this provision?

Response (a):

No. OSHA does not treat a tree branch or utility line conductor or cable as a lower level for purposes of assessing compliance with 29 CFR 1926.502(d)(16)(iii), as incorporated in 29 CFR 1910.269(g)(2)(iv)(B) and 29 CFR 1926.954(b)(3)(ii).

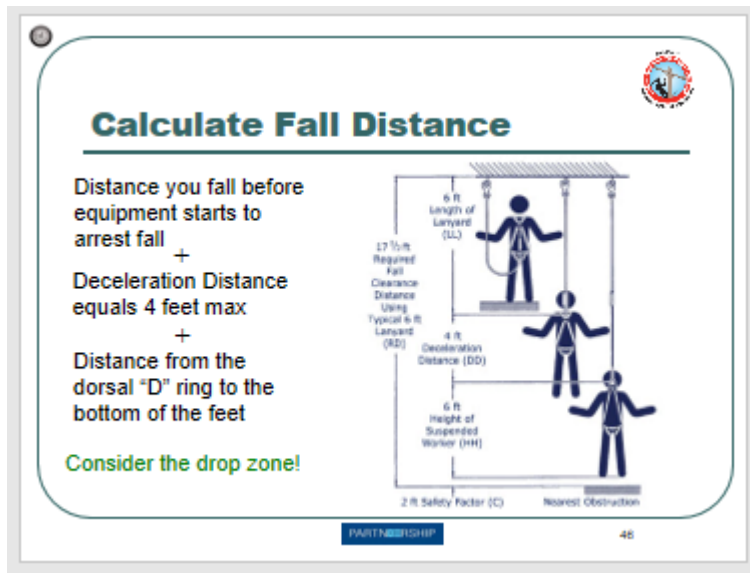
Question (b):

Does OSHA consider a tower leg, cross bracing, or lattice work to be a “lower level” for purposes of this provision?

Response (b):

No. OSHA does not treat a tower leg, cross bracing, or lattice work of a type commonly found on a tower, a substation structure, or a similar structure as a lower level for purposes of assessing compliance with 29 CFR 1926.502(d)(16)(iii), as incorporated in 29 CFR 1910.269(g)(2)(iv)(B) and 29 CFR 1926.954(b)(3)(ii).

Slide 46



Emphasize that the standard states that the protection must be rigged so the person cannot strike an object at a lower level.

Slide 47



If workers are wearing all the right equipment, and are using it correctly... injuries should be minimal. However, taking a fall puts a significant amount of strain on a person's body. They can still experience things like whiplash, bruising, and soreness.

Additionally, this could be considered a traumatic event for a lot of people. Even if they didn't receive any significant injuries. It's a scary situation to find yourself in. Some employees will panic, faint, or go into shock.

During their training, explain to your employees the importance of remaining calm. Remind them that you have a fall rescue plan. Assure them that they will be rescued as quickly as possible.

OSHA recognizes the importance of rescuing employees as quickly as possible. [Standard 1926.502\(d\)\(20\)](#) states that employers must provide "prompt" rescue in the event of a fall.

What's the reasoning for this? Prolonged exposure after a fall could result in adverse health effects. Specifically, suspension trauma. Suspension trauma can lead to heart and kidney failure. It happens when a person is unable to maintain proper blood flow.

So how do you define "prompt" rescue?

Everyone experiences suspension trauma at different rates. Based on scientific research, 10-15 minutes is the absolute maximum that an employee should be left suspended. However, irreversible health effects can be seen in as little as 5-6 minutes.

Most professionals recommend that prompt rescue take place within 3-5 minutes.

The faster you can get them down, the better. Employees are less likely to suffer from adverse health effects if you can get them to safety as quickly as possible.

[illegible]

Assisted Rescue

When an employee is unable to pull him/herself to safety, others working nearby must jump to action. They just have to be trained. Depending on the severity of the situation, you might want to call 911 anyway. But don't wait for them to arrive -- remember, you need to get the employee down as quickly as possible.

Suspension Trauma

- Perform rescue and treatment as quickly as possible
- Recognize signs and symptoms of suspension trauma
- Minimize suspension time

3 Brain Circulation

- Swollen Head Face
- Blurred Vision
- Darker Area in Brain Damage
- Death

2 Heart Circulation

- Anxiety and Heart of Shock
- Heart Rate Increases
- Cardiac Arrhythmia

1 Leg Circulation

- Muscle Spasms
- Blood Pooling
- Muscle Tendon Pump Failure
- Blood Pressure Drop to Anger Artery

*Suspension trauma is a medical condition resulting from prolonged periods of suspension. The danger of cardiac arrest will occur due to the lack of venous blood returning back to the heart (blood pooling). Therefore, the danger of suspension trauma is not only the physical trauma of the suspension, but also the medical condition of the suspension.

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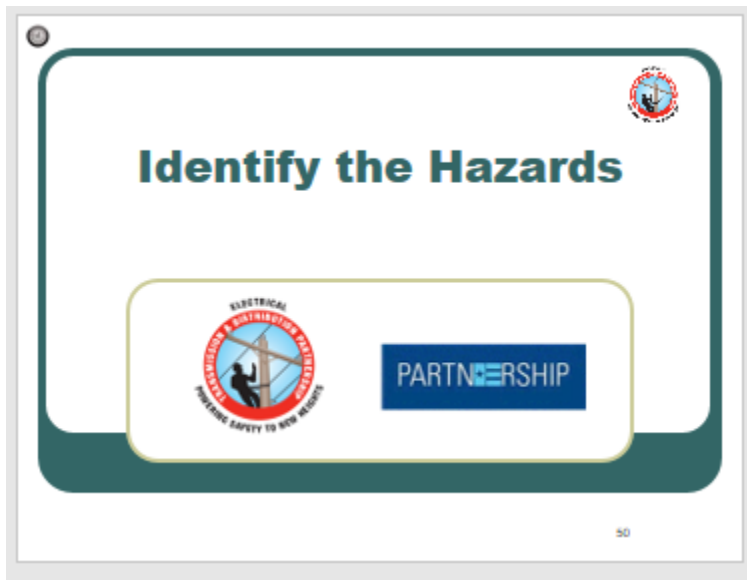
Suspension trauma is a deadly condition brought on by an extended period of orthostatic intolerance. Orthostatic intolerance happens when a person remains in a sedentary position for a prolonged period of time. Blood accumulates in the veins, and interferes with proper blood flow.

When blood cannot circulate throughout the body, vital organs do not get enough oxygen. Without an adequate supply of oxygen to the brain, fainting will occur. Kidney failure can also happen, as the kidneys require oxygen-rich blood to function properly

If not addressed quickly, these conditions could be fatal.

Prolonged suspension from fall arrest systems could cause orthostatic intolerance. The suspension trauma that employees can experience will result in unconsciousness first, potentially followed by death. This can occur all within 20-30 minutes.

Slide 50



Introduce the module. Explain that this is the next module in the continuing quarterly education series.

Slide 51



TRAINER NOTE: Your options are to use:

- 1) This presentation as developed to prompt hazard recognition classroom discussions; or
- 2) The presentation as developed along with the alternative activity approach to encourage student note taking regarding hazard recognition (see "Falls_HazRec_Alt Activity" folder provided); or
- 3) Your own photos to cover the hazard recognition component.

Slide 52



YES



Workers could fall while climbing wooden poles without fall restraint.

PARTNERSHIP

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The fall restraint device here has been disabled.

Slide 53



Any Fall Hazard Here?



PARTNERSHIP

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Slide 54

YES

Workers are exposed to a fall hazard when transferring from an aerial lift to the spacer cart

Workers must be protected from falls over 6 feet.



PARTNERSHIP

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Workers are exposed to a fall hazard greater than 6 feet, while transferring to the spacer cart.

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Any Fall Hazard Here?



PARTNERSHIP

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Slide 56



YES



Vice Grips are not an adequate working surface.

NO

PARTNERSHIP

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Worker is standing on a pair of channel-lock pliers.

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Is This a Fall Hazard?



PARTNERSHIP

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Worker is bolting a piece of steel onto a transmission tower.

Slide 58

YES

The photo shows a worker standing on a bull-pin. A step-bolt would provide a safer support surface.

This could expose workers to a 12 foot fall.

PARTNERSHIP

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The worker is standing on a bull-pin. The pin could become dislodged and allow the worker to fall.

Slide 59

Can You Identify the Fall Hazard?

PARTNERSHIP

59

Worker on transmission tower.

Slide 60

YES

Positioning devices must be rigged so that the worker cannot free-fall more than 2 feet.

PARTNERSHIP

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Workers using positioning devices must rig these devices in such a manner so that they cannot free-fall more than 2-feet.

Slide 61

Can You Identify the Fall Hazard?

PARTNERSHIP

61

Work performed from an aerial lift basket.

Slide 62



Worker is standing on the mid-rail of the aerial lift basket.



PARTNERSHIP

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Workers must stand with both feet firmly on the floor of an aerial lift basket. They cannot stand on mid-rails gain working height.

Slide 63



Can You Identify the Fall Hazard?



PARTNERSHIP

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Worker is operating a 5-drum machine.

Slide 64



Worker is exposed to a fall hazard. Guardrails should be installed.

Ground access ladder has no hand rails.

Worker is exposed to an impalement hazard from falling on the ground rod.

PARTNERSHIP

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Workers must be protected from falls by means of a fall protection or fall restraint device.

Slide 65

Can You Identify the Fall Hazard?



PARTNERSHIP

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Worker is assisting crewmember in directing a concrete chute.

Slide 66



YES

Worker is exposed to a fall hazard. A backhoe bucket is NOT a suitable working surface

Partnership

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Workers must not work from unsuitable working surfaces.

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Training

Partnership

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Training

Who is Trained?	On What?
Each employee who will be exposed to fall hazards	- Procedures to be followed to minimize hazards - The nature of fall hazards in work area - Correct procedure for fall protection system used - Rescue procedures

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Note 2 to paragraphs (b)(3)(iii)(B) and (b)(3)(iii)(C): Until the employer ensures that employees are proficient in climbing and the use of fall protection under §1926.950(b)(7), the employees are not considered "qualified employees" for the purposes of paragraphs (b)(3)(iii)(B) and (b)(3)(iii)(C) of this section. These paragraphs require unqualified employees (including trainees) to use fall protection any time they are more than 1.2 meters (4 feet) above the ground.

Slide 69

Retraining

Changes in:

- Workplace
- Types of fall protection or equipment

Inadequacies in employee's

- Knowledge
- And/or Use of

69

Explain that retraining must be conducted when there is a change in the workplace, types of fall protection or equipment, or inadequacies in employee knowledge or use of equipment.

Certification of Training

Written certification prepared by employer

- Record of each employee trained
- Date of training



CERTIFIED

PARTNERSHIP

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Certification of Training

The latest training certificate shall be maintained

- Training done by others
 - Date employer determined prior training was adequate

A circular logo with a maroon outer ring containing the text "FALL PROTECTION" at the top and "TRAINED" at the bottom in white capital letters. The center of the logo is white and features a black silhouette of a person wearing a full-body safety harness and climbing a rope.

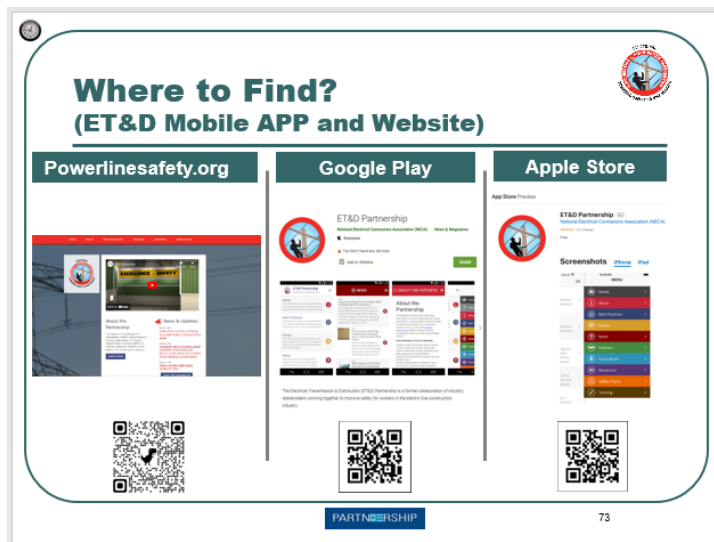
The standard also states that the employer must keep a written certification of this training. This is accomplished through training sign in sheets and/or written knowledge assessments. Training documentation should contain the date of training, the person who conducted the training, and employee signature.

Slide 72



The following section will discuss fall protection training criteria.

Slide 73



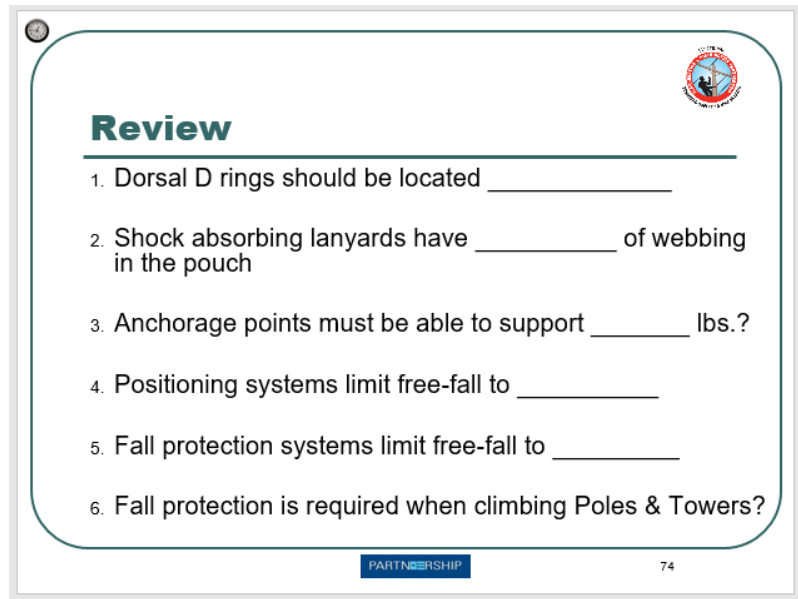
The ET&D Mobile APP is available at the APP store on your mobile device. **Take a little time and have the participants download on their phone. If you want to at a break, pull up the slide and those in the classroom can scan the QR Code to help them download as well.**

Mobile App

The ET&D Partnership launched an app in 2016 which features the 14 Partnership-developed Best Practices, ET&D Partnership news updates, and other relevant topics. The app is available through the ET&D Partnership Website, Apple's Store and Google Play.

Facilitator click on the hyperlink to the partnership website and show the class where to find all the best practices and other information.

Slide 74



Review

1. Dorsal D rings should be located _____
2. Shock absorbing lanyards have _____ of webbing in the pouch
3. Anchorage points must be able to support _____ lbs.?
4. Positioning systems limit free-fall to _____
5. Fall protection systems limit free-fall to _____
6. Fall protection is required when climbing Poles & Towers?

PARTNERSHIP 74

1. Between the shoulders
2. 3 ½ feet
3. 3000 lbs for positioning and 5000 lbs per employee for fall protection
4. Class A-24-in and Class B- 54-in
5. 6 Feet
6. True