2021 OVERVIEW SERIES: PERSONAL FALL ARREST SYSTEMS
FACT SHEET

LENGTH: 12 MINUTES

PROGRAM SYNOPSIS:
Performing work on an elevated surface is inherently dangerous due to the risk of falling. When proper guardrails or other means of fall protection are not installed, a personal fall arrest system is usually required. A personal fall arrest system, consisting of a full body harness, a connecting device and anchor point, is designed to reduce the amount of force exerted on a worker during a fall and to prevent the falling worker from striking a lower level or hitting the ground below. Various OSHA standards require an employer to ensure that each employee is trained in the proper use of a fall arrest system before he or she uses the equipment. That's the purpose of this program—to discuss the proper selection, inspection and usage of fall arrest components as well as the total fall distance calculation and the rescue plan for retrieving fallen workers.

PROGRAM OBJECTIVES:
After watching the program, the participant should be able to explain the following:
- How to don a full body harness properly;
- What the various types of connective devices are;
- Why it is critical to always select an approved anchor point;
- What to look for when inspecting a harness and connecting device;
- How to calculate the total fall distance;
- How fallen workers may be rescued and why rescue must be done promptly.

INSTRUCTIONAL CONTENT:

PERSONAL FALL ARREST SYSTEMS OVERVIEW
- Performing work on an elevated surface is inherently dangerous due to the risk of falling. When proper guardrails or other means of fall protection are not installed, a personal fall arrest system will be required for industrial workers at heights beginning at four feet or 1.2 meters and for construction workers beginning at six feet or 1.8 meters.
- A personal fall arrest system is designed to reduce the amount of force exerted on a worker during a fall and to prevent the falling worker from striking a lower level or hitting the ground below.
- A fall arrest system consists of three essential components: a full-body harness, a connecting device and an anchor point.
- A full body harness is designed to distribute the shock load of the fall to various points on the body to reduce the risk of injury.
- A connecting device, such as a lanyard or a self-retracting lifeline, provides a connection between the body harness and the anchor point.
- You must select an anchor point that has been verified by a qualified person as being able to support 5,000 pounds or 22.24 kilonewtons per person connected to it.
- Workers who wear a personal fall arrest system must be able to calculate the "total fall distance." This distance includes the worker's height, the length of the connecting device and the amount of elongation or "stretch" in the system.
- A self-retracting lifeline, also called a fall-limiting device is often used in situations where it is determined that a traditional lanyard is too long to prevent the worker from hitting the ground.
- When a person falls and is left hanging in a harness, it is critical that they be rescued promptly. Hanging in a harness can cause blood to pool in the legs and can result in unconsciousness and even death in less than 30

minutes. This is referred to as "suspension trauma syndrome" and preventing it is the goal of your organization's rescue plan.

- Before using a personal fall arrest system, workers must be trained in its use, understand the rescue plan and inspect all components of the system to ensure they are in good condition and show no indication that they have been subjected to the force of a fall.
- When it comes to personal fall arrest systems, the most common fatal mistake is failing to connect. Always practice "100 percent tie-off" anytime you are required to wear your personal fall arrest system.

THE FULL BODY HARNESS

- A full body harness used as part of a personal fall arrest system is designed to distribute the shock load of a fall to various points on the body to reduce the risk of injury.
- To don the harness properly, hold it by the back, or dorsal, D-ring and gently shake it; this will allow the harness to fall into shape.
- Then, slip your arms through the shoulder straps like you would put on a jacket. Next, place the chest strap at mid-chest and tighten, then pull the leg straps around your legs and secure them snugly.
- Harnesses are designed to have a snug, secure fit while working above ground. Leaving the leg straps loose can lead to serious injuries during a fall, as the straps are driven violently upwards into the groin area.
- Always inspect the body harness prior to use and ensure that it is in good condition and does not show any indication that it has been exposed to the force of a fall.
- A harness may have multiple D-rings, but only the dorsal D-ring should be used as the connection point for fall arrest purposes. The other D-ring locations are designed for positioning, restraint or rescue purposes.

THE CONNECTING DEVICE

- A connecting device used as part of a personal fall arrest system provides a secure connection between the full-body harness and the anchor point.
- There are several types of connecting devices, including single lanyards, shock absorbing lanyards, Y-shaped lanyards designed for moving between anchor points and self-retracting lanyards, also known as fall-limiting devices.
- Connecting devices must be rated to support 5,000 pounds or 22.24 kilonewtons. This rating must be apparent on the device label.
- Connecting devices must feature a double-locking snap hook. A double-locking snap hook is designed to prevent an inadvertent opening of the keeper gate.
- To open this type of snap hook, you must first depress the safety catch with your thumb before being able to open the keeper gate with your finger.
- Some lanyards are equipped with an energy control segment, also known as a "shock absorber." This segment is designed to absorb the energy of a fall by elongating to a maximum distance of 3½ feet or about one meter.
- A fall-limiting device works differently. This type of connecting device is designed to allow a worker to move freely as work is being performed, but will quickly brake or lock-up should a fall occur. A fall-limiting device reduces the force of a fall by quickly limiting the fall distance.
- When using a fall-limiting device, or self-retracting lifeline, avoid moving too far away from the anchor point. This can inadvertently extend the length of the retracting lifeline beyond the height of the anchor point. When this is the case, a falling worker will hit the ground.
- Also, be aware that moving away from the anchor point can cause a falling worker to swing through a large arc and strike objects with great force. A good rule of thumb is to stay within 15 degrees of the anchor point at all times.
- Always inspect the connecting device prior to use and ensure that it is in good condition and does not show any indication that it has been exposed to the force of a fall.

THE ANCHOR POINT

- An anchor point as part of a personal fall arrest system is a secure point of attachment for equipment such as horizontal lifelines, lanyards or deceleration devices.
- An anchor point must be able to support 5,000 pounds or 22.24 kilonewtons of dead weight per person connected to it or must be designed and installed as part of a complete personal fall arrest system which maintains a safety factor of at least twice the potential impact energy of an employee free falling the distance permitted by the fall arrest system.
- The capacity and suitability of any anchor point used as part of a fall arrest system must be verified and approved by a qualified person.
- Electrical conduit, guardrails and similar objects are not strong enough to bear the force of a fall and cannot be used as anchor points.
- As a worker required to use a fall arrest system, it is your responsibility to know which structures have been verified and approved as anchor points. If you are unsure, stop and ask the proper authority before beginning work.
- When connecting to an anchor point, it must always be located at or above the height of the dorsal D-ring on your harness. Connecting to an anchor point below the D-ring will add additional free fall distance which can result in serious bodily injury or equipment failure should a fall occur.
- There are a variety of anchor point attachments available. Make sure you understand how to properly connect and use any device you plan to use as an anchor point.
- Do not create an anchor point by looping a lanyard over an I-beam or other structure and connecting it back to itself. Most lanyards are not designed for this purpose. This reduces the lanyard's strength by half and can also allow the lanyard to be cut or damaged by the sharp edge of the I-beam.
- To create an anchor point from a beam, use a beam strap that is specifically designed for this purpose.

INSPECTION OF THE HARNESS AND CONNECTING DEVICE

- Before using a personal fall arrest system, you must inspect its components. To inspect the harness and lanyard, check every strap for frayed or torn webbing or stitching.
- Also, verify that there are no burns, chemical damage or signs of deterioration to any webbing or component.
- Look for any indication that the item has been exposed to the forces of a fall, such as distorted buckles, D-rings, snap hooks or keeper gates.
- Look closely at any energy-absorbing devices for signs of torn stitching or elongation. Harnesses, lanyards and fall-limiting devices may also display a red alert-indicator to indicate the item has been exposed to the force of a fall.
- Damaged devices or those that have been involved in a fall must be removed from service.

THE TOTAL FALL DISTANCE CALCULATION

- The total fall distance calculation is used to determine the maximum distance through which a worker will fall while using a personal fall arrest system. This calculation is critical when determining the necessary height of an anchor point and for selecting an appropriate connecting device.
- The total fall distance is determined by adding the worker's height, the length of the lanyard or connecting device and the amount of elongation or stretch in the system.
- For example, a six-foot tall worker, using a six-foot shock-absorbing lanyard that will elongate an additional 3½ feet during a fall, has an initial fall distance of 15½ feet. Once we add in a three-foot safety factor, we arrive at a total fall distance of 18½ feet or about 5.7 meters.
- In this situation, the anchor point must be located at least 18½ feet or 5.7 meters above the ground to ensure the worker won't contact the ground during a fall. If this is not possible, a shorter lanyard or a fall-limiting device may be used to reduce the fall distance.

•   Do not perform elevated work unless you have done this total fall distance calculation and have determined that your fall arrest system will prevent you from hitting the ground or a lower level should you fall.

THE RESCUE PLAN

•   A rescue plan for safely retrieving a fallen worker must be in place before employees can use a personal fall arrest system.

•   The American National Standards Institute, or ANSI, recommends that rescue operations be able to reach a hanging fall victim in less than six minutes. To accomplish this, the rescue plan should ensure that rescue equipment such as ladders or a mobile elevating work platform is readily accessible.

•   If rescue equipment is not readily available, then a properly trained rescue team should be nearby and available to perform a technical rescue if needed.

•   When a person falls and is left hanging in a harness, it is critical that they be rescued promptly. Hanging in a harness can cause blood to pool in the legs and can result in unconsciousness and even death in less than 30 minutes. This is called “suspension trauma syndrome.”

•   To help prevent suspension trauma, a person hanging in a harness should frequently pump their legs as if riding a bicycle.

•   Another option is to outfit workers with a strap and loop device, sometimes called a “suspension safety strap.” Once connected properly, the hanging worker can stand on the strap or place one foot in a loop in order to reduce pressure on the harness leg straps and restore circulation of blood into the legs while awaiting rescue.

•   If your organization’s rescue plan includes the use of these types of devices, make sure you become proficient in their use by practicing in a controlled setting.

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ANSWERS TO THE REVIEW QUIZ

1. b
2. a
3. c
4. a
5. b
6. c
7. a
8. c
9. a

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REVIEW QUIZ

Name____Date_______________________________

The following questions are provided to determine how well you understand the information presented in this program.

1. The back D-ring on a full-body harness is also known as the __________ D-Ring.

a. Cranial
b. Dorsal
c. Ventral

2. Harnesses are designed to have a snug, secure fit while working above ground.

a. True
b. False

3. Connecting devices must be rated to support ______________.

a. 500 pounds or 2.22 kilonewtons
b. 1,000 pounds or 4.45 kilonewtons
c. 5,000 pounds or 22.24 kilonewtons

4. When using a self-retracting lifeline, a good rule of thumb is to stay within ______________ of the anchor point at all times.

a. 15 degrees
b. 25 degrees
c. 45 degrees

5. Any employee who has training and experience in the use of fall arrest equipment is permitted to verify the capacity and suitability of an anchor point.

a. True
b. False

6. Creating an anchor point by looping a lanyard over a structure and connecting it back to itself reduces the lanyard's strength by __________.

a. One quarter
b. One third
c. One half

7. Fall arrest harnesses and lanyards that are damaged or involved in a fall must be removed from service.

a. True
b. False

8. When calculating the total fall distance, you should add a __________ safety factor.

a. 1-foot
b. 2-foot
c. 3-foot

9. ANSI recommends that rescue operations be able to reach a hanging fall victim in less than ________________.

a. 6 minutes
b. 10 minutes
c. 12 minutes