SURVIVING THE FALL:
The Proper Use Of Your Personal Fall Arrest System

This easy-to-use Leader's Guide is provided to assist in conducting a successful presentation. Featured are:

INTRODUCTION: A brief description of the program and the subject that it addresses.

PROGRAM OUTLINE: Summarizes the program content. If the program outline is discussed before the video is presented, the entire program will be more meaningful and successful.

PREPARING FOR AND CONDUCTING THE PRESENTATION: These sections will help you set up the training environment, help you relate the program to site-specific incidents, and provide program objectives for focusing your presentation.

REVIEW QUESTIONS AND ANSWERS: Questions may be copied and given to participants to document how well they understood the information that was presented. Answers to the review questions are provided separately.

INTRODUCTION

You know what they say: "It's not the fall that gets you, it's the sudden stop," and of course, the farther we fall, the more forceful and damaging that sudden stop becomes. The proper use of a personal fall arrest system allows a worker to survive a fall, with minimal injury by not only preventing the falling worker from hitting the ground, but also by limiting the amount of force imparted onto the worker when the fall is arrested. In this program, viewers will see fall protection equipment deployed in actual fall events and learn the proper selection and use of these devices. In addition to safe work practices, such as 100 percent tie-off techniques, emphasis is placed on having a rescue plan in place should a fall occur.

Topics include selection of an approved anchor point, use and inspection of connecting devices, body harnesses, preventing sudden-stop injuries, calculating total fall distance, use of fall-limiting devices, self-rescue from suspension trauma and employing the rescue plan to retrieve a fallen worker.

PROGRAM OUTLINE

SELECTION OF AN APPROVED ANCHOR POINT

- The personal fall arrest system consists of three main components: an anchor point, a connecting device and a full-body harness. Each of these components is critical to the successful operation of the system as a whole.

- The Occupational Safety and Health Administration's general industry regulations require an anchor point be able to support 5,000 pounds or 22.2 kilonewtons of "dead weight" per person connected to it.

- Five thousand pounds or 22.2 kilonewtons is a lot of weight. An anchor point must be very substantial to be able to hold that much force.

- Do not use conduit, light fixtures, handrails and similar objects as anchor points. These items are simply not strong enough to support the loads generated during a fall event; using an improper anchor point can quickly lead to disaster.

- OSHA requires that the capacity of any anchor point used as part of a fall arrest system be verified by a qualified person.

- As a worker who must use a fall arrest system, you must understand which structures in your facility have been verified as approved anchor points.

- There are a variety of specialty devices available which can be used to create an anchor point. These devices must be marked as being rated for 5,000 pounds or 22.2 kilonewtons, but simply reading this label is not enough to verify that your anchor point is sufficient.

- When any type of device or component is used to create an anchor point, a qualified person must verify that the device, the structure to which it is attached and the method of attachment to that structure all meet the load bearing requirements.

USE OF CONNECTING DEVICES

- The connecting device is used to provide a connection between the body harness and the anchor point. There are several types of connecting devices, including single lanyards of various lengths and styles, Y-shaped lanyards designed for moving between anchor points and retractable lanyards, also called fall-limiting devices or retractable lifelines.

- Connecting devices which are part of a fall arrest system must be rated to support 5,000 pounds or 22.2 kilonewtons and must be labeled as such.

- Of course, a lanyard's strength-rating depends on its proper use. A common mistake is using the lanyard to cross over a beam or other object and then connecting back to itself.

- This is very dangerous because connecting a lanyard to itself reduces the strength of the lanyard by half. In addition, this exposes the lanyard to the sharp edge of a beam which may cut or damage the stitching.

- Fall arrest equipment must always be protected from cuts, abrasion and other damage. Protect your lanyard by using a beam strap or other device specially designed for this application instead.

- Also, do not allow a lanyard to become tied in a knot. Knots reduce the strength of the lanyard.

- Finally, do not use any part of your fall arrest system to move, hoist or secure materials. Only use this lifesaving equipment for its intended purpose.

DOUBLE-LOCKING SNAP HOOKS

- Connecting devices must also feature a double-locking snap hook. A double-locking snap hook requires two separate movements to release the keeper gate of the hook.

- A double locking snap hook is designed to prevent an inadvertent opening of the keeper gate. Operating this type of hook takes a bit of practice so make sure you are proficient using it before needing to do so above ground.

- To ensure hooks are oriented for maximum strength during a fall and to prevent accidental disengagement, only connect a snap hook to a compatible device intended for this use.

- Do not connect snap hooks to rope or webbing and do not connect it to wire rope or directly to a horizontal life line. Also, do not connect a snap hook to other snap hooks.

- In addition, do not connect two snap hooks into one D-ring. D-rings are only designed to accommodate one snap hook.

INSPECTION OF THE CONNECTING DEVICE

- Like any other piece of safety equipment, you should always inspect your connecting device prior to use. Look for any torn stitching, cuts, tears, frayed materials, burns or chemical damage.

- Inspect the hook and keeper gate for any cracks, bending or distortion.

- Look for any indications that the lanyard has been subjected to the force of a fall. Look at any energy-absorbing devices for signs of torn stitching or elongation. Lanyards and fall limiting devices may also display a red alert tag or provide an indicator when it has been exposed to the force of a fall.

- Damaged devices or those devices exposed to the force of a fall must not be reused. Dispose of the damaged device and replace it with a new one according to your company's procedures.

THE BODY HARNESS

- During a fall, the body harness is designed to distribute the shock load of a fall to multiple points on the body, reducing the likelihood of injury. In addition, the harness provides a support platform which allows the worker to remain upright and supported after a fall.

• Before putting on a harness, you must first perform an inspection. Check for damaged webbing, torn stitching or distorted buckles and D-rings.

• Also inspect for any burns or chemical damage. Inspect the harness for any indication it has been exposed to a fall.

• Damaged harnesses or those exposed to a fall should not be used and must be removed from service and replaced according to your company's procedures.

• Once your inspection is complete, it's time to put the harness on; however, sometimes it's hard to tell one part from another in order to get started. One way to sort it out is to find the back D-ring and gently shake out the harness so that it falls into shape.

• Once the harness is hanging, you can slip your arms through the shoulder straps using the same techniques as putting on a jacket.

• Next, place the chest strap about mid-chest and tighten. If the harness has a connected chest strap, you'll have to put your head through this hole to don it properly.

• If you have done it correctly, the rear D-ring will be located between your neck and shoulder blades and finally, pull the leg straps around your legs and snugly secure the straps.

• Here's an important point to remember, harnesses are designed to have a snug, secure fit while working above ground. A common mistake is to work with the straps too loose.

• This is especially true with leg straps. Falling with loose leg straps can be very painful and cause injury as the straps are driven violently upwards into the groin area.

PREVENTING SUDDEN-STOP INJURIES

• When we mentioned earlier that "it wasn't the fall that gets you, but the sudden stop," we weren't just having fun with an old expression; it's literally true.

• A worker weighing 225 pounds who is exposed to the full force of a six-foot fall will generate around 2,500 pounds of force when stopped suddenly. Even when wearing a full body harness, workers can be severely injured by this level of force, even without hitting the ground.

• To prevent these "sudden-stop injuries" the Occupational Safety and Health Administration, OSHA, requires that a fall arrest system reduce the amount of force imparted onto a worker wearing a body harness to not exceed 1,800 pounds or 8 kilonewtons.

• One common method used to reduce the force during a fall event is to use an energy-absorbing lanyard. This type of connecting device features a section of material sewn together in such a way that it tears and elongates when exposed to excessive forces during a fall; as the material elongates, it absorbs the energy of the fall, slows the rate of decent and brings the worker to a controlled stop.

• With limited exceptions, OSHA regulations mandate that workers not be permitted to free fall more than six feet. This is why most lanyards are six feet long and are only designed to absorb the energy of a six-foot fall.

• Here's a quick tip. To ensure that you do not exceed a free fall distance of six feet, you should always connect your lanyard to an anchor point located at or above the level of the D-ring on your harness.

• In other words, do not connect your lanyard to an anchor point below your D-ring. Doing so adds distance to your fall which can cause you to fall farther than six feet, which places excessive force on your body and your fall arrest equipment.

LIMITING FALL DISTANCE

• Another method used to limit the forces generated during a fall is to limit the fall distance. This is commonly done by the use of a fall limiting device, sometimes called a self-retracting lifeline. These popular devices allow a worker to move freely away from the anchor point and then quickly deploy a braking system in the event of a fall.

• In general, the smaller units have a rapid breaking system which stops a worker’s fall within two feet or less, while some of the larger units are designed to withstand a full six-foot fall and utilize a gradual braking system to reduce the force of the fall over an additional three and a half feet.

• As with all components of your fall arrest system it’s critically important that you understand your connecting device and how it is designed to operate. When used incorrectly, these devices will not prevent a falling worker from hitting the ground. We’ll next learn how this can happen and how to make sure it doesn’t happen to you.

• Here is an example of a common mistake. This training mannequin was tied off 15 feet above the ground, using a six-foot harness, yet it impacted the ground with enough force to cause serious lower leg injuries.

CALCULATING TOTAL FALL DISTANCE

• To prevent hitting the ground during a fall, workers must be able to calculate their total fall distance. The total fall distance is the maximum distance a worker will fall from the anchor point.

• To calculate this distance, you must add the worker's height, plus the lanyard length, plus the elongation length of any energy-absorbing device or braking mechanism.

• OSHA mandates that the maximum elongation or braking distance of energy-absorbing devices be 42 inches which is three and half feet.

• The total fall distance for this six-foot worker wearing a six-foot energy-absorbing lanyard with a designated elongation of three and half feet is 15 ½ feet.

• After adding an additional three-foot safety factor to our calculation, we see that our anchor point must be a minimum of 18 ½ feet high for a six-foot worker to safely use this type of six-foot energy-absorbing lanyard.

• Eighteen and a half feet is pretty high. It’s also a distance that is hard to estimate visually; so, if you are unsure, measure it.

USE OF FALL-LIMITING DEVICES

• Of course, there are many situations where a worker is exposed to a fall hazard at heights less than 18 ½ feet. In these situations, workers can use a shorter lanyard, but a more common solution is to use a fall-limiting device.

• As we mentioned earlier, many fall-limiting devices will stop a falling worker in two feet or less. This greatly reduces the amount of force placed onto the falling worker.

• When using one of these devices, it is extremely critical that the anchor point be at or above the level of your back D-ring.

• Connecting these devices below the D-ring not only adds to your free-fall distance, but will allow you to free-fall farther than two feet and may exert a force onto the device which exceeds its design limits.

• Another common mistake when using a self-retracting lifeline is moving too far away from the anchor point. It’s possible to extend the length of the retracting life line beyond the height of the anchor point. When this is the case, you will hit the ground should a fall occur.

• In addition, even if you don’t hit the ground, moving too far from the anchor point causes a large swing arc during a fall. A large swing arc can cause you to strike objects with great force during a fall event.

• To prevent these types of incidents, a good rule of thumb is to keep your lifeline within a 15-degree angle to the vertical at the anchor point.

PREVENTING COMMON FALL ARREST MISTAKES

- Remember the purpose of your fall arrest system is for you to survive a fall, with minimal injury, should one occur.

- Unfortunately, the most common mistake workers make concerning their fall arrest system is failing to connect to the anchor point when above ground. Far too many workers have fallen to their deaths while wearing a perfectly good body harness because they simply failed to connect it to the anchor point.

- Another common mistake is temporarily disconnecting your lanyard in order to move to another anchor point.

- Utilizing a Y-shaped lanyard to connect to a new anchor point before disconnecting from the current one allows you to be tied off and protected 100 percent of the time.

- Be aware that a proper Y-shaped lanyard is manufactured with a single snap hook to be connected to the harness D-ring. Recall that connecting two hooks to one D-ring is prohibited, so do not use two separate lanyards for this purpose.

SELF RESCUE FROM SUSPENSION TRAUMA

- Ultimately, surviving a fall depends on you and your decision to properly use your fall arrest system every time it's required. There is however another potential element to fall survival that many people fail to consider: the rescue.

- After a fall has occurred a worker will be left hanging in their harness, often at a great height above the ground. This can present a challenge for a prompt rescue.

- A prompt rescue is critical because the effects of hanging in a harness for an extended period of time can be fatal. These potentially deadly effects are called orthostatic intolerance. It's commonly referred to as "suspension trauma."

- When our body is hanging in a harness, blood accumulates in the veins of the legs due to gravity and a lack of movement. This pooled blood continues to accumulate over time and reduces the amount of blood available for circulation; a lack of blood flow leads to a loss of consciousness and damages vital organs such as the kidneys, leading to renal failure and eventually death.

- There are many factors which effect how quickly suspension trauma will occur, but OSHA's Safety and Health Information Bulletin, SHIB 03-24-2004 (updated in 2011), states that suspension in a harness can result in unconsciousness, followed by death, in less than 30 minutes.

- While awaiting rescue, a fallen worker may help prevent suspension trauma by periodically pumping their legs up and down which helps return some of the pooled blood in the legs back into circulation; however, the effectiveness of this method is reduced by the compressing action of the leg straps.

- There are simple devices available which can be connected to your D-ring which provide a step on which to stand and straighten your legs.

- It's easy enough to make a similar device by carrying a proper length of rope, tying it in a knot and securing it through your D-ring. If your rope is the correct length, it will provide a loop onto which you can place your foot and straighten and pump your legs.

- Standing up and periodically pumping the legs is more effective in preventing suspension trauma and relieves the pressure of the harness straps on your legs and thighs.

- Be aware that once you fall while wearing a harness, the pressure on the harness straps may block your ability to access your pockets or other storage areas. Make sure you place your rescue equipment in a location that can be easily accessed after a fall.

EMPLOYING YOUR FACILITY'S RESCUE PLAN TO RETRIEVE A FALLEN WORKER

- There are a wide variety of rescue methods which can be used to safely retrieve a fallen worker. Before working above ground and using a fall arrest system, make sure you understand your facility's rescue plan.

- Perhaps the simplest method is to have a co-worker, who must also be wearing a proper fall arrest system, assist the worker back onto the level from which they fell.

- If this is not possible, a worker may be quickly recovered using a ladder or a mobile work platform. Of course, for this to be effective the ladder or mobile platform must be nearby and of suitable height to safely reach the worker. Having appropriate rescue equipment nearby should be part of a proper rescue plan.

- More elaborate rescue plans may include connecting the worker to a rescue line and lowering or raising them to a safe level. This type of rescue requires trained rescuers be available with immediate access to rescue equipment designed for this purpose.

CONCLUSION

- Surviving a fall means being prepared to fall 100 percent of the time that you are working above ground. This not only requires properly using your fall arrest equipment each and every time you work at height, it also requires an elevated commitment to your own personal safety.

- After all, having a sky-high commitment to personal safety and fall prevention is the only way to make sure that you safely return to solid ground.

PREPARE FOR THE SAFETY MEETING
Review each section of this Leader's Guide as well as the DVD or digital media. Here are a few suggestions for using the program:

Make everyone aware of the importance the company places on health and safety and how each person must be an active member of the safety team.

Introduce the program and then play it without interruption. Review the program content by presenting the information in the program outline.

Here are some suggestions for preparing your video equipment and the room or area you use:

Check the room or area for quietness, adequate ventilation and temperature, lighting and unobstructed access.

Check the seating arrangement and the audiovisual equipment to ensure that all participants will be able to see and hear the program.

CONDUCTING THE PRESENTATION
Begin the meeting by welcoming the participants. Introduce yourself and give each person the opportunity to become acquainted if there are new people joining the training session.

Explain that the primary purpose of the program is teach viewers how to properly select and use the components of a personal fall arrest system as well as the safe work practices that reduce the risk of falls and minimize injuries in the event of a fall.

Introduce the program. Play it without interruption. Review the program content by presenting the information in the program outline.

Lead discussions the personal fall arrest equipment used at your facility and your company’s policies for working above ground safely.

After watching the program, the viewer will be able to explain the following:

- How to select an approved anchor point;
- How to use and inspect connecting devices;
- How to inspect and put on a body harness properly;
- How to prevent sudden-stop injuries;
- How to calculate total fall distance;
- How to use fall-limiting devices properly:
- How to prevent suspension trauma in the event of a fall.

SURVIVING THE FALL:
The Proper Use Of Your Personal Fall Arrest System
REVIEW QUIZ

Name___________________________________Date_________________________________

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

1. The components of a fall arrest system include which of the following:
a. The anchor point
b. The connecting device
c. The body harness
d. All the above

2. OSHA's general industry regulations require an anchor point be able to support _______ pounds per person connected to it.
a. 500
b. 1,000
c. 5,000

3. OSHA requires that the capacity of any anchor point used as part of a fall arrest system be verified by a qualified person.
a. True
b. False

4. Snap hooks may be connected to any object of suitable strength provided the hook is able to close properly.
a. True
b. False

5. The body harness is not considered part of the fall arrest system and does not require an inspection prior to use.
a. True
b. False

6. Before working above ground the harness leg straps should be _____________.
a. adjusted for a loose fit.
b. disconnected.
c. adjusted for a snug fit.

7. OSHA requires that a fall arrest system reduce the amount of force imparted onto a worker wearing a body harness to not exceed ___________.
a. 5,000 lbs
b. 1,800 lbs
c. 3,000 lbs

8. OSHA regulations mandate that workers not be permitted to free fall more than 6 feet. To prevent falling farther than 6 feet your anchor point should be located __________________.
a. below the harness D-ring.
b. at or above the harness D-ring.
c. as high as possible above ground level.

9. The total fall distance is the maximum distance a worker will fall from the anchor point. Which of the following is ***not*** a part of the total fall distance calculation?
a. Worker's height
b. Lanyard length
c. Height of anchor point
d. Lanyard elongation distance

10. Which of the following best describes the minimum height for an anchor point to be used safely?
a. The total fall distance
b. The total fall distance plus 3 feet
c. The total fall distance minus 42 inches

11. To prevent moving too far from the anchor point, your retracting life line should be kept within a ____________ to the vertical at the anchor point.
a. 20 degree angle
b. 15 degree angle
c. 33 degree angle

ANSWERS TO THE REVIEW QUESTIONS

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