

TerranearPMC Safety Share

Week of May 1, 2017 – Personal Fall Arrest Systems

The number one cause of death in the construction industry is *falling from heights*. Unfortunately, even though this type of accident has remained in the occupational limelight for years, investigations seem to concur that people seem to be making the same fundamental mistakes again and again.

Listed below are some of the problems typically encountered while working at height:

1. Underestimating the “falling at work” problem
2. Automatically selecting fall arrest as the control method of choice
3. Lack of understanding of the equipment and its application
4. Inability to rescue workers once they’ve fallen
5. Misunderstanding the basic skills in fall protection
6. Improper use of fall protection with ladders and aerial lifts

As the hierarchy of controls philosophy demands, only when engineering and administrative controls cannot be applied, then and only then, should personal protective equipment be employed. Such is the case for personal fall arrest systems or PFAS.

PFAS are comprised of 3 components. The anchor point, full body harness and the lanyard. It’s essential to understand not only the requirements of each component, but just as importantly, how the components work together as a system. It is critical that the user understand each of the components. And while it is not a requirement to have all the components of a PFAS made by the same manufacturer this is a good practice as each manufacturer tests their products with their components.

The first component, the anchor point, is a fixture to which a person attaches the line with a hook, to be held securely so as to prevent a fall. This point must be able to withstand a weight of 5000 pounds for each person anchored. Meanwhile, anchorage connectors are tie-off points which secure a connecting device to the anchor point. Anchorage selection is critical because, should a fall occur, the worker will be suspended from that anchorage—with his or her life depending on its strength. The anchorage should be easily accessible, located a safe distance above any lower obstacle.

It is important to understand the distinction between an anchorage and an anchorage connector. An anchorage, could be an I-beam while an anchorage connector might be a cross-arm strap, or choker, wrapped around the beam to permit attachment. There are two primary kinds of anchor points:

Permanent Fall Arrest Anchor: A permanent anchor would be installed in a location where a worker would regularly work (providing the work can’t be redesigned, or a guardrail or use fall restraint is not feasible).

Temporary Fall Arrest Anchorage Connector: A temporary anchor would be installed in a location where a worker would rarely go, or with a task of a short duration. In many circumstances it would take longer to install an anchor than to do the actual job!

Ideally, the anchor should be installed directly overhead. There are 2 key reasons for this:

1. the higher the anchor point the shorter the free fall; and
2. anchoring overhead eliminates the “pendulum” effect



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Walking out from under your anchor could cause you to swing should you fall. You could hit a wall or column. This is also called the “pendulum effect”. Therefore, it is always best to connect to an anchor directly overhead.

The next critical factor for a PFAS is the full-body harness. This includes hardware, webbing, and pads, each with specific functions.

Webbing is typically tightly woven yarn that slides through hardware without snagging. If webbing is cut, burned, frayed, etc., it **MUST** be removed from service. Webbing should meet the ANSI standard of 5,000 pounds (22 kN) tensile strength, endure traditional abrasion tests without fraying and puckering, and resist natural weather effects. In a harsh chemical environment, it must resist toxic chemical fumes and splashes. Stitching should be strong enough not to rip away during a fall.

Padding should be pliable and easy to adjust, to ensure a comfortable fit. Padding also must withstand harsh weather and maintain its shape. Because padding can become brittle in cold weather, select padding that features breathable fabric and durable construction.

The placement and connection of the chest strap and back D-ring (where the lanyard is connected to the harness) are critical for proper harness fit and safety. Chest straps must be positioned in the mid-chest area. Back D-rings must be located in the middle of the back between the shoulder blades. Both must be tightened for a snug fit.

The third major component of a PFAS is the lanyard. The lanyard is a flexible line securing a full-body harness to an anchorage point. There are two basic categories: non-shock-absorbing and shock-absorbing. The more common and safer is the shock-absorbing variety, which comprises the majority of all lanyards sold today. Shock-absorbing lanyards provide deceleration distance during a fall, reducing fall arresting forces by 65-80 percent below the threshold of injury, as specified by OSHA and recommended by ANSI. The most reliable include a special shock-absorbing inner core material surrounded by a heavy-duty tubular outer jacket that doubles as a backup web lanyard. Per OSHA, all lanyards must have double-action, self-closing, self-locking snap hooks to reduce the possibility of a connecting rope from slipping out of the hook.

Shock absorber packs can be attached to, or built into, non-shock-absorbing lanyards to provide shock-absorbing capability. During a fall, an inner core smoothly expands to reduce fall arrest forces. Some feature a backup safety strap.

Shock absorbing lanyards as well as retractable types, are designed to be used in a fall arrest system that doesn't exceed a 6 foot free fall. For instance, should a person connect to a point at his feet, in the event of a fall, the worker would experience an approximate free fall of 12 feet. Typical shock absorbing lanyards or retractables are not designed to experience free falls of this magnitude and could result in life-threatening injuries. However, because the safety industry has recognized that these scenarios (anchoring below the worker) are sometimes necessary (as no anchor point above the work location may be available), manufacturers have designed products that are equipped to experience free falls up to 12 feet.

As with all PPE, comfort is crucial. If any PPE feels slightly uncomfortable upon initial donning, then in a short time, that discomfort will increase to pain. And when that happens, there is a tendency to remove the PPE, which would place the wearer at serious risk.

One final caution, once a piece of PFAS is used – that is, used during a fall – the entire unit – webbing, lanyard and anchor connector – must be removed from service!

The care of human life and happiness, and not their destruction, is the first and only object of good government Thomas Jefferson

