Personal Fall Arrest Systems



Key Takeaways:

– Understanding the hazards posed by falling four feet (1.2 m) or more without and with a personal fall arrest system.
– Learning about the components of a personal fall arrest system and how they work together to arrest a fall.
– Recognizing the steps for properly inspecting and donning the full-body harness.
– Learning about the key fall arrest system design requirements, including the maximum free fall distance permitted, the maximum deceleration distance allowed, and the safety factor required for lanyards and anchorage points.
– Comprehending the criteria for properly attaching the connecting device to an anchorage connector, vertical or horizontal lifeline.

Course Description

The Occupational Safety & Health Administration (OSHA) requires employers to establish a personal fall arrest program for fall protection everywhere employees are exposed to serious fall hazards, and protection by other means such as guard rails or nets are not used. Usually, these programs identify common hazards and offer solutions for mitigating them, often by instructing the use of fall protection systems, outlining situations where fall arrest devices are appropriate for use.

You must understand how personal fall arrest systems work and what behaviors are required to use them safely. Always, it is good practice to visually inspect these systems and physically test them prior to use.

Majority of personal fall protection systems involve wearable harnesses, designed to suspend a free falling worker. It is necessary for these systems to be tethered to structural points capable of withstanding a lot of force. Even when there is a harness properly in place, the force needed to arrest a free fall places considerable stress on the body. To fully illustrate the scope of this, imagine a 200-pound person free-falling 6 feet, with an additional distance of 3.5 feet for the system to completely arrest the fall, which will equal to a total force of 542 pounds of force pushed on the body. It is challenging for the human body to defy gravity; while personal fall arrest

systems save lives, the body can be incredibly stressed by the act of violent restraint.

When the harness is improperly positioned or improperly attached, the stress to the groin, back, and chest drastically increases. Pressure on the legs from the leg straps supporting the body’s weight, even for properly worn harnesses, can restrict blood flowing to and from the legs. In the case that the worker cannot be rescued quickly, serious injury can result from this condition. In fact, even when all parts of the system work perfectly, a worker suspended in a body harness faces the serious hazard of restricted blood flow to and from their legs.

More than just the ground poses a hazard to employees working at heights. Any contact with lower level structure or other object beneath workers poses a serious hazard in a fall, even when wearing fall arrest equipment. To limit a worker’s fall distance and the deceleration forces on the worker’s body to safe levels, the components in a personal fall arrest system must be designed to work together.

One way to prevent this situation until rescue can be accomplished is through using trauma suspension straps. The purpose of these straps is to be deployed by the suspended worker and attached to the body harness, and allow the person to stand with one or both feet in a stirrup. The body’s weight is lifted from the leg straps that tend to cut off circulation to the legs until the worker is rescued.

For your safety in the event of a fall, OSHA standards require specific minimum requirements. The anchorages for the personal fall arrest equipment must be capable of supporting at least 5,000 pounds per employee attached. As well, rings and snap hooks must be capable of sustaining a minimum tensile load of 5,000 pounds. In addition, self-retracting lifelines and lanyards that automatically limit free fall distance to 2 feet or less need to be capable of sustaining a minimum tensile load of 3,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.

On the other hand, all self-retracting lifelines and lanyards that do not limit free fall distance to 2 feet or less, ripstitch lanyards, and tearing and deforming lanyards must be capable of sustaining a minimum tensile load of 5,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.

Advice for properly attaching your connecting device to an anchor point: – Whenever possible, work directly under the anchorage to avoid injury resulting from swinging and striking another object during a fall. – Make sure that the anchorage is at a height that will not allow a lower level to be struck should a fall occur. – Always attach to the anchorage or anchorage point specified by the qualified person. – Always tie off in a manner that limits free fall to the shortest possible distance. – Never attach your snap hook around a sharp or rough edge. Use a cross-arm strap or other compatible anchorage connector. – Never attach multiple lanyards together. What is the best protection from falling at work? Awareness. Encourage everyone to always wear personal fall arrest systems, and to remain vigilant about the presence of potential pitfalls when working at heights. Fall Protection Systems As stated by OSHA compliance standards for construction activities, wherever a fall from a height of 6 feet

or more is possible, guardrail systems, personal fall arrest systems, safety net systems, or some other fall protection device must be used. Examples of fall protection systems include guardrails, temporary warning lines, warning monitors, fall restraint systems, and fall arrest systems. Guardrail Systems Often, permanent guardrails are constructed as part of stairways, landings, work platforms, or equipment access platforms. In all places that short-term fall hazards exist, temporary guardrails are used. Guardrails are required to meet certain guidelines to be compliant with regulatory standards. Guardrails need to include a top rail, mid rail and toe-board. As well, the top rail must be between 39 and 45 inches above the working surface (or ground), and capable of withstanding 200 pounds of force downward or outward. To meet this requirement, commercial grade 2 x 4 lumber or better needs to be used. Likewise, a guardrail's mid rail needs to be capable of withstanding 150 pounds of force downward or outward. Lastly, the toe-board needs to be 3.5 inches above the working surface and capable of withstanding 50 pounds of force downward or outward. Under no circumstance, should there be more than a quarter of an inch gap between the bottom of the toe-board and the working surface. In the case that tools, equipment or materials are stacked higher than the top edge of a toe-board, paneling, screening or safety nets need to be used from the working surface or toe-board to the top of the mid- or top-rail. Temporary Warning Lines This topic consists of ropes, wires, chains and supporting props designed for short-term hazards. Temporary warning lines need to be flagged no less than every six feet with high-visibility material, and signage must be posted indicating controlled access during construction. As well, warning lines must be no lower than 34 inches and no higher than 39 inches from the walking surface. Warning Monitors Warning monitors are defined as competent personnel assigned to keep others away from a fall hazard, and they should only be utilized when all other means of fall protection are not possible. Warning monitor positions need to not have any other duties in addition to keeping people away from the fall hazard. Fall Restraint Systems A fall restraint system restrains an employee to prevent them from falling to a lower level, as you may have guessed. These systems consist of anchorages, connectors, body belts/harnesses, lanyards, lifelines and rope grabs. Every anchorage point used for fall restraint needs to be capable of supporting four times the intended load, and must be ridged so there is no vertical free fall if the employee slips. Fall Arrest Systems Conversely, fall arrest systems are designed to minimize injury from a fall. As much as possible, fall arrest equipment must be used correctly to prevent injury. Equipment for fall arrest symptoms include body support devices (harnesses), lanyards and anchorages. Body Support Devices Body support devices move the arresting force of a fall to the strongest parts of the body. Examples of body support devices include waist belts, chest harnesses and sub-pelvic full body harnesses. Waist belts are meant to be used as only restraints, with an average of two minutes of endurance. On the other hand, chest harnesses are designed for rescue and restraint and have an average of six minutes of endurance. thirdly, sub-pelvic full body harnesses average ten minutes of endurance and, of the three, are preferred. Individuals aren't out of danger even after they are caught from a fall by a fall arrest system. It takes 15 to 20 minutes for the suspension from a harness to cause blood to pool in the legs, eventually making the suspended individual pass out. All the un-circulated blood in the legs proceeds to lose oxygen and become toxic, causing a dangerous condition known as suspension trauma. In order to reduce suspension trauma, you should utilize a body harness with suspension trauma straps that you can use to hook your feet into and push your body upward, allowing your blood to continue

circulating. Lanyards Lanyards are designed to hook to the body support device and stretch when loaded. Stretching decelerates impact speed and arresting force when the wearer falls. Typically, lanyard harnesses are rated for a total capacity of 310 pounds. It is the employer’s responsibiity to choose the proper length lanyard for the job; too long and it may not prevent the fallen individual from striking surfaces or objects below them. When considering the lanyard’s snap-hook device, only self-enclosing and self-locking types should be used, and two lanyards should never be connected together. Anchorages Anchorage points, which personal fall arrest equipment is attached to, ultimately support the equipment and the individual in the event of a fall. OSHA standards require that any anchorage used for attachment of personal fall arrest equipment needs to be independent of any anchorage being used to support or suspend platforms. Examples of anchorages include cross-arm straps for wrapping around approved structural members, driven anchorage points that affix temporarily or permanently to the structure, concrete anchors that are drilled into the concrete floors or walls, and bar anchors that span an opening.