

SAFE WORK PRACTICES

FALL PROTECTION PLAN

Purpose is to inform and educate employees and sub contractors working for DVS of the hazards and risks associated with working on scaffolding, man lifts and from heights.

WHEN TO USE FALL PROTECTION

- Fall protection must be used if worker is in danger of falling 3 meters or more.
- There is a risk of hitting something that may injure the worker more than hitting the ground.
- There are no safety rails present.
- The worker may fall onto a hazardous substance/object, or through an opening in a work surface.

HAZARDS & RISKS

- Falling from an elevation
- Falling tools and equipment
- Insecure planking
- Insecure poles

RESPONSIBILITIES

- It is the responsibility of the crew leader and/or the DVS Supervisor to supervise erection and dismantling of scaffold.
 - Provide proper direction to those who are erecting scaffold and ensure they are using the proper equipment such as guard rails and outriggers when needed.
 - The crew leader and/or the DVS Supervisor must maintain and inspect scaffold before use.
- The scaffold must be tagged before and after use using scaffold tags provided by DVS.
 - Red – Danger Not Safe for Use
 - Yellow – Caution Potential Hazards – Trained personnel only
 - Green – Safe for Use by Everyone

SAFE WORK PRACTICES

- It is the responsibility of the DVS Supervisor to ensure our workers have the proper fall protection needed for site specific jobs including body harnesses, life lines, rope grabs, etc. and are knowledgeable in the use and inspection of such equipment. The DVS Supervisor must also orientate each worker according to the OH&S guideline changes as of July 1/09.
- It is the responsibility of the general contractor to ensure DVS workers are able to use the fall protection as needed and legislated including engineer stamped and properly installed anchor points, control zones etc.

FALL ARREST RESCUE PROCEDURES

All scissor and man lift staff are to be trained by a DVS Supervisor and deemed competent in all areas related to fall arrest prior to operation of any machinery. ***No one working for DVS should ever be using fall protection while working alone.***

Because the occurrence of a fall is traditionally rare and no rescue attempt is predictable, DVS insists that 911/emergency services be called immediately, no matter the condition of the fallen worker. A designated person should be sent to the site entrance to meet and direct emergency services and provide important information such as what floor and the workers condition after the fall. Be sure to also notify the "safety committee" immediately of the incident so a full investigation can take place.

It is imperative that a rescuer does not panic after the initial fall. Allow yourself a moment to complete a mental hazard assessment before proceeding with any rescue. Be observant and avoid hazards that will compound the situation.

Rescue plans don't have to be complex. Rescuers should know basic signs of identifying orthostatic intolerance and should know basic treatment of a fallen worker once rescued.

Prior to any work starting and fall protection being used, a few questions need to be answered.

Communication:

What communication will be used between the suspended worker and the Supervisor/Rescue team?

Direct voice communication

Mobile phone

Two-way radios

How will rescuers get to the casualty?

Rescue ladder

Pull casualty in through a window or balcony

Aerial equipment from ground

Crane man basket

How will others be protected?

Assign someone to direct traffic if needed

Set up barriers

Might there be a language barrier?

What are the weather conditions?

Usual features of building need to be taken into account.

Rescue Options for a Conscious Worker

- Call 911/emergency services.
- Determine the safest/fastest method to rescue worker.
- If the fallen worker is on a lift, the lift should be brought down to a height where it is possible for ground personnel to safely assist the worker out of his/her fall protection.
- Should the worker be in control of the lift after the fall (manual controls) the worker should be guided by ground personnel to bring the lift down until ground personnel is able to safely assist the worker out of his/her fall protection.
- If a fallen worker is resting along the side of a building, place a ladder (if available and long enough) against the building with a 30 degree angle and steady the ladder so the worker can get onto the ladder.
- Should a fallen worker be at an elevation too high to reach with a ladder, assemble as much manpower as possible and immediately and manually pull the worker back up to point of anchor (if using this method, other workers over the control zone must also be anchored off).
- Should there be access to reach the fallen worker from a balcony or window, carefully pull them in through the access area.
- Remember, in some circumstances, self-rescue may be an option.

Rescue Options for an Unconscious Worker

- Call 911/emergency services.
- Determine the safest/fastest method to rescue worker.
- Use a man lift to retrieve the worker by positioning the basket under the worker and slowly raising the basket until the worker is safely in the basket. Unhook the lanyard from the life line and attach to the safety rails of the lift basket. Slowly lower to the

ground and allow emergency workers to perform first aid prior to moving the worker from the basket (if possible).

- Should a fallen worker be at an elevation too high to reach with a ladder, assemble as much manpower as possible and immediately and manually pull the worker back up to point of anchor (if using this method, other workers over the control zone must also be anchored off).
- Should there be access to reach the fallen worker from a balcony or window, carefully pull them in through the access area.

All information on the topic of fall arrest tells us that there are only minutes to react and retrieve a fallen worker before their health is seriously jeopardized. Harnesses can become deadly whenever a worker is suspended for durations of over five minutes in an upright posture with the legs relaxed straight beneath the body. After five minutes they are highly likely to be unconscious – but workers attending the scene may not realize the seriousness of the situation. The cause of this problem is called ‘suspension trauma’.

Suspension Trauma

Unless the worker is rescued promptly suspension trauma caused by orthostatic intolerance could occur and result in serious or fatal injury as the brain, kidneys and other organs are deprived of oxygen. Most users of fall protection equipment are unaware of the hazard of suspension trauma.

Venous pooling

Death from suspension trauma is caused by orthostatic intolerance and is the result of venous pooling. This can occur any time a person is required to stand still for prolonged periods and may be worsened by heat and dehydration. Major blood vessels pass through the muscles in the legs. The movement of these muscles assists circulation by squeezing blood back up towards the heart. If the muscles stop moving, gravity pulls the blood down into the legs. Eventually enough blood accumulates (venous pooling) so that return blood flow to the right chamber of the heart is reduced as the heart can only pump the blood available, so the output begins to fall. The heart then speeds up to maintain sufficient blood flow to the brain but, if the blood supply to the heart is restricted enough, the higher pulse and fast breathing is ineffective and the body abruptly slows the heart. The result is fainting.

The moment a person loses consciousness, they collapse and become horizontal so the time spent in a vertical position while unconscious is minimal and as blood flow improves the person returns to consciousness and recovery is likely to be rapid. When a person is suspended in a harness in which their legs are immobile, unlike fainting, the person does not or cannot naturally move into a horizontal position. Gravity pulls blood into the lower legs. In a harness, the worker can't fall into a horizontal posture, so the reduced heart rate causes the brain's blood supply to fall below the critical level. During excessive venous pooling, cardiac output and arterial pressure fall to levels which can critically reduce the quantity and/or quality of oxygenated blood flowing to the brain.

Three things that occur which aggravate the problem:

- the worker is suspended in an upright posture with legs dangling
- the safety harness straps exert pressure on leg veins, compressing them and reducing blood flow back to the heart
- the harness keeps the worker in an upright position, regardless of loss of consciousness

Loss of consciousness assures that a suspended person will not be moving their limbs; so venous pooling will increase which will in turn reduce the circulating blood volume even further. The time spent in an unmoving suspended position with the legs below the heart is what kills.

The best rescue strategy is to take every possible precaution to prevent workers from falling in the first place. But the reality is that falls happen and a rescue plan is an essential component of DVS's overall fall protection method statement and risk assessment. The lack of any form of a pre-conceived post-fall rescue plan not only puts the fall victim at risk but also puts rescuers in harm's way. Whenever there are unplanned attempts to rescue, second or third injuries or fatalities may not be uncommon.

1. Before the fall

The key issue to fall protection prior to a fall is compliance. If a harness is too uncomfortable, too inconvenient or interferes too much with task completion, workers may not use the equipment or may modify it (illegally) to make it more tolerable which would be grounds for termination. A second major point is how far a worker falls before his fall is arrested. The greater the fall, the greater the stress on the body. The longer the lanyard the longer the fall distance. The shorter the lanyard, the more often it will have to be repositioned when workers are moving. Retractable lifelines are the preferred method of workers because it allows maximum flexibility. Working with a retractable lifeline prevents the worker from falling, yet should a fall occur, the arrest distance is kept to a minimum.

2. At fall arrest

The whole concept of fall protection is that a worker who falls will be stopped by a tethering system. Unfortunately, the posture of the fallen worker is unpredictable. Depending on the harness attachment point and the position of the workers body at fall arrest, different harness attachments offer different advantages.

3. Suspension

It is natural to assume that once a fall has been arrested then the fall protection system has successfully completed its job. Unfortunately this is not the case. A worker suspended in an upright position with the legs dangling in a harness of any type is subject to suspension trauma and orthostatic intolerance. Fall victims can slow the onset of suspension trauma by pushing down vigorously with the legs or by positioning their body in a slight leg-high position. Harness design and fall injuries may prevent these actions.

4. Rescue

Rescue must come rapidly to minimize the dangers of suspension trauma. The circumstances together with the lanyard attachment point will determine the possibility of self-rescue. Regardless of whether a worker can self-rescue or must rely on others, time is of the essence because a worker may lose consciousness in a matter of minutes. For conscious casualties, it is recommended (where possible) that the suspended person keep their legs moving to keep the blood pumping and reduce the risk of venous pooling.

Death by Rescue – “Toxic Shock”

If a worker is suspended long enough to lose consciousness, rescue personnel must be careful in handling such a person or the rescued worker could still become a fatality. The blood which has pooled in the legs is prevented from collecting oxygen from the lungs and becomes stale as it is starved of oxygen. It then becomes loaded with carbon dioxide and is contaminated with toxins.

If the casualty is laid down during the rescue, the stale blood rushes back to the heart and vital organs. This rush of de-oxygenated and toxic blood can cause death by heart attack or, a few days later, of organ failure. Current recommended procedures following a rescue are to keep the casualty in a knees-bent “W” sitting position or a kneeling position for 30 to 40 minutes before moving the casualty to a lying down horizontal position. This action partially closes the femoral artery allowing any pooling of blood to be slowly released back towards the heart. The blood is then able to be re-processed, preventing orthostatic and toxic shock.

*Normal first aid rules don't apply in cases of rescue trauma. It is vitally important that emergency and medical personnel are **not** allowed to lie down or transfer the casualty to a stretcher before allowing any pooling of blood to be slowly released back towards the heart.*

What to look out for if a worker is suspended in a harness...

The possible signs and symptoms of orthostatic intolerance can start to be seen in 2/3 minutes and can include:

| | | | |
|-------------|------------------------------------|--------------------|-----------|
| Faintness | Nausea | Breathlessness | Dizziness |
| Sweating | Low or high heart rate | Low blood pressure | Paleness |
| Hot Flashes | Skim tone may appear grey in color | Loss of vision | |

Always make sure you call 911/emergency services after an incident of fall arrest. It doesn't matter what degree the fallen worker is injured, they should always be looked at afterwards.