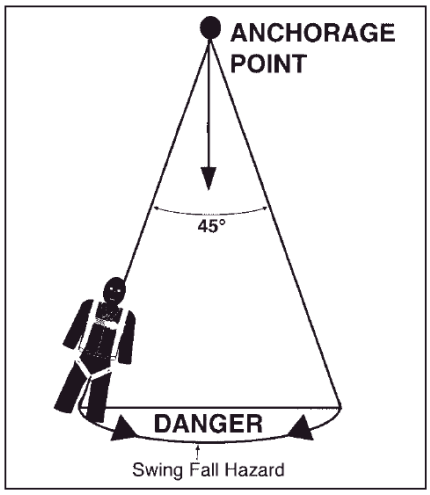
TOOLBOXTALK

SWING RADIUS FOR FALL PROTECTION



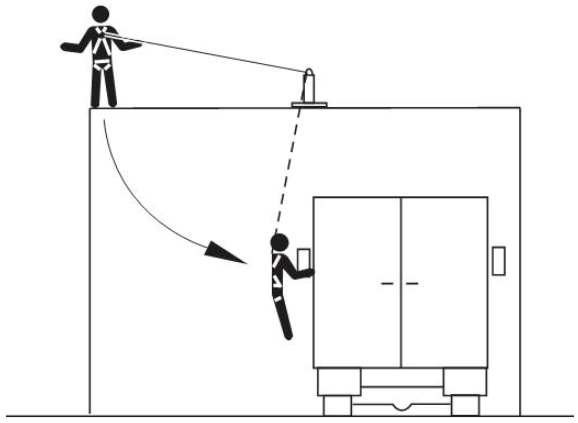
As we all know, free fall must be limited in any effective fall protection system. However, there is another kind of force which must be limited as well: swing fall. Just like free fall, additional swing fall increases the severity of injury by delivering forces that were not meant for the protective equipment or the fall protection system. Swing fall and free fall both can have potential injuries to the musculoskeletal system and organs resultant from impact at an improper speed.

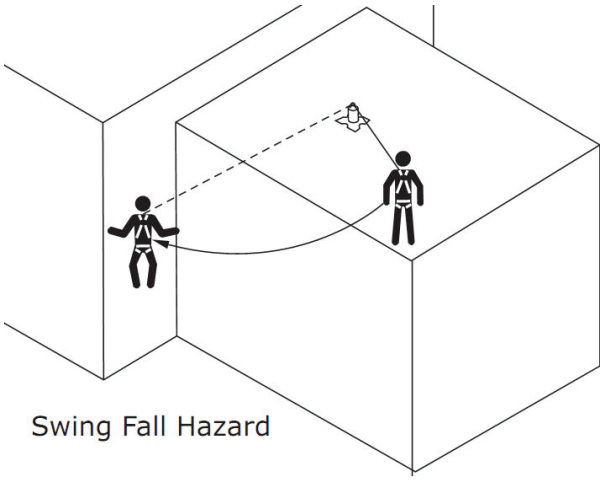
Swing fall occurs when a lanyard, fall restraint, or fall arrest line rotates the falling worker around the anchor point. The difference between free fall and swing fall is that free fall has no reduction or speed in a downward path, while swing fall can actually move the falling body against the force of gravity. However, it can also deliver a person at an excessive velocity towards an unforgiving point of impact, a threat to the line / fall arrest equipment, or into a dangerous situation (into electrical lines, sharp edges, etc.). The centrifugal force rotates the falling user around the anchorage point. The area between the anchor and the moving person on the path of that rotation arc is called the swing radius.

In other words, if you are not hanging directly in line with your anchor point, you will swing like a pendulum. In the diagrams on this page, we see a worker working at an angle away from the anchor. As the worker falls over the edge, the safety line will not engage until the lanyard and line are taught – that is the free fall. The next movement by the worker is swing fall, which will be both lateral and downward.

In fact, the system will not fully stop the downward movement until the workers is directly in line with the anchor point. This is critical when designing the fall protection system; the further out of line with the anchor, the further down the user can swing fall. The potential distance of free fall and swing fall is the most important factor in the severity of possible injury. However, maintaining the anchorage within 15 degrees of the user's position is generally a good practice.

An additional danger that could be life threatening is the pendulum motion of swinging back and forth along the roof edge. This motion will cut and damage the safety line which could result in that employee falling to a lower level. Rope protectors should be used to help protect the safety lines. But even if a rope protector is used, sliding along the roof edge with the force of a swinging person can cut through many protectors, so limiting the distance of that sliding motion through the elimination of the swing distance is crucial.


Unexpected Hazards


Swing Fall Hazard

Good safety practices include pre-planning the work location with all workers involved in that task, and never working beyond 15 degrees from an anchor point. Be sure to use adequate rope protection to keep safety lines from being damaged along the roof edge.

DO

- Make sure that you have proper protection on your safety line to ensure it won't be damaged.
- Make sure you work in line attached to sound anchor points that can support the proper load.
- Make sure you wear the proper full body harness with the proper lanyard and rope grap.
- Make sure to rig your fall arrest to minimize freefall and swing fall.

DON'T

- Do not work farther than 15 degrees from your anchor points.
- Do not work without proper planning.
- Do not work with a low or open rope grab.

REVIEW QUESTIONS

1. When rigging for fall protection you must:
   a) Always tie-back within 15 degrees of a straight line to your anchor point
   b) Protect your ropes from any damage
   c) Keep the rope grab above the shoulders or higher
   d) All of the above
2. It does not matter where your tie-back is.
   a) True
   b) False: You need to make sure it is no more than 15 degrees from your anchor point.
3. You need to protect your safety lines at all times
   a) True: Any time a rope moves under load, damage can occur.
   b) False

OSHA Standard
No. 1926.651
Excavation Manual

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