What Is an Anchorage?

Anchorage, anchorage points, or anchor points are the connections for both vertical and horizontal personal fall arrest systems. They may be as simple as a D-ring or eyebolt mounted at an appropriate location. Alternatively, they can consist of subsystems such as posts, brackets, trolleys, and other mobile devices. They can support lifelines, nets, guardrails, and stair rails. They are designed for anticipated static and dynamic forces during a fall.

This first component of the personal fall protection equipment triangle—the anchorage—makes this equipment unique among most other forms of personal protective devices. Unlike hard hats, glasses, or safety shoes issued to workers, which allow them to walk away protected, fall arrest equipment must be attached to something. And that something is a part of your plant, building, or structure. This means the anchorage point must be carefully planned into the job to ensure continuous and complete protection during the work task, including travel to and from the elevated workstation. Skyhooks should not be mythical; they should be real.

The Fall Protection Code recognizes two types of anchorages: certified anchorages are those designed or approved by a Qualified Person considering peak dynamic loading with a safety factor of 2; and non-certified anchorages are those of unquestionable strength, at least 5,000 lbs, chosen by a Competent Person. These correspond to the selection criteria given by OSHA in the Subpart M construction standards and proposed general industry standards for Fall Protection.

Selection Considerations

Considerations in the selection of an anchor point minimally should include the following:

1. **Independent from the work surface whenever possible.** For example, instead of attaching to the back rail of a two-point swing scaffold, attach a separate lifeline to a suitable, independent anchor point overhead on the structure. Anchorages are typically best positioned at 7 to 7-1/4 feet above work level. Then, should a support cable fail, causing the swing scaffold to drop down, the worker will not be pulled down in a potentially lethal swing fall. Alternatively, to avoid scaffold failure, the scaffold requires its own cable or lifelines.

   In situations where it is necessary to attach to part of the work surface, first consider using a structural location that is not likely to fail catastrophically. If this part still is arguably a hazard because it appears flimsy, an independent means of anchorage must be designed. Arrangements such as tripods over manholes, four-point suspended scaffolds, work platforms and certain building structures may provide suitable anchorage points for both loadlines and fall protection. If you have no access to an engineer in the field, always consider a worst-case scenario to help you make a reasonable judgment for adequacy. Never underestimate the forces involved!
2. **Capable of being identified for workers by a Qualified Person and clearly marked.** For example, the members of a roof truss should be subject to engineering calculations, tested for ultimate strength, and modeled accordingly. The same applies to railings, tower struts, and overhead pipes. Paint all approved locations and configurations a bright orange or yellow so workers know exactly where to hook up their equipment. If the general rule in a facility is that nearly all markers may be used as an anchorage, then labels or signs or markings should indicate what is not to be used and why.

3. **Suitable minimum attachment heights,** i.e., waisthigh for the belt-lanyard combination (prohibited for fall arrest but permitted for fall restraint); shoulder-level for a harness-lanyard combination, and overhead for self retracting lifelines and self retracting lanyards (SRLs). Remember that energy-absorbing lanyards will be needed to meet the OSHA force limit of 1,800 lbs. For SRLs, however, it is essential to ensure installation far enough above workers to remove any head obstructions and to eliminate dangerous lifeline slack that might contribute to swing fall hazards, excessive free fall and higher force levels.

   In each case cited here, the objective is to keep the free fall distance to a minimum and ease self-recovery.

   Equipment manufacturers should engineer anchorage points to meet these criteria. Anchorage points at waist level or below may be easier to engineer into the structure, but they are not adequate, except for restraint. (This means a system designed to prevent the worker from reaching the fall hazard.) One example is a calf-height horizontal lifeline installed parallel to and 6 feet back from the leading edge of a new deck along which railings are being erected and where all leading edge work is done in the kneeling position. In this case, a harness and 6-foot lanyard may provide adequate restraint yet allow sufficient mobility.

   For an aerial lift or scissors lift, a floor-mounted anchorage point may not provide the required worker mobility without excessive potential free fall. Therefore, in this case, the anchorage point must be higher.

4. **Sufficient strength, based upon federal or local requirements and manufacturer’s guidelines.** The needed anchor strength for a fall arrest system depends upon the potential forces on that point with an additional acceptable safety factor. In some cases, required strengths can be reduced to allow consideration of other potential anchor points; careful collaboration with the manufacturer on each specific system is imperative. The OSHA regulations allow anchorage-point strength based upon twice the anticipated dynamic load (maximum arrest force) for engineered systems.

5. **Attachment points for horizontal lines to provide protected lateral, mobility.** To fall while moving laterally away from a fixed anchorage point can produce a perilous pendulum-like swing fall. The danger of such a fall results from the horizontal force levels being generated through the swing, which equal those generated by a vertical fall through the same distance, but