

(3) Personal fall protection systems for climbing activities shall be activated within two feet (.61 m) after a fall occurs, in order to limit the descending velocity of an employee to seven feet/sec (2.1 m/sec) or less.

(4) Mountings for rigid carriers shall be attached at each end of the carrier, with intermediate mountings, as necessary, spaced along the entire length of the carrier, to provide strength necessary to stop employee falls.

(6) Mountings for flexible carriers shall be attached at each end of the carrier. When the system is exposed to wind, cable guides utilized with a flexible carrier shall be installed at a minimum spacing of 25 feet (7.6 m) and a maximum spacing of 40 feet (12.2 m) along the entire length of the carrier, to prevent wind damage to the system.

(7) The design and installation of mountings and cable guides shall not reduce the design strength of the ladder.

(c) System performance criteria. (1) Ladder safety devices and their support systems shall be capable of withstanding without failure a drop test consisting of an 18 inch (.41 m) drop of a 500 pound (226 kg) weight.

(2) All other personal fall protection systems for climbing activities shall be capable of withstanding without failure a drop test consisting of a four foot (1.2 m) drop of a 250 pound (113 kg) weight.

Appendix A to Subpart I—Personal Fall Protection Systems

§ 1910.128 Personal fall protection systems.

The following information generally applies to all personal fall protection systems.

1. *Selection and use considerations.* The kind of personal fall protection system selected should match the particular work situation, and any possible free fall distance should be kept to a minimum. Many systems are generally designed for a particular work application, such as a lineman's body belt and pole strap, a rebar belt and chain assembly, or a window cleaner's belt. Consideration should be given to the particular work environment. For example, the presence of acids, dirt, moisture, oil, grease, etc., and their effect on the system, should be evaluated. Hot or cold environments may also have an adverse effect on the system. Wire rope should not be used where an electrical hazard is anticipated. As required by the standard, consideration must also be given to having means available to rescue an employee should a fall occur, since the suspended employee may not be able to reach a work level independently.

Where lanyards, connectors, and lifelines are subject to damage by work operations, such as welding, chemical cleaning, and sandblasting, protection of the component, or other securing systems should be used. Unless designed for use in a personal fall arrest system, linemen's pole straps should not be used as lanyards. Chest harnesses should not be used where there is a possibility of any free fall. The employer should fully evaluate the work conditions and environment (including seasonal

weather changes) before selecting the appropriate personal fall protection system. Once in use, the system's effectiveness should be monitored. In some cases, a program for cleaning and maintenance of the system may be necessary.

2. *Testing Considerations.* Before purchasing a personal fall protection system, an employer should insist that the supplier provide information about the system based on its performance during testing of the system using recognized test methods so that the employer will know that the system meets the criteria in this standard. Otherwise, the employer will not know if the equipment is in compliance unless samples he has purchased are tested. Appendix C contains test methods which are recommended for evaluating the performance of any system. Not all systems need to be tested; the performance of a system can often be based on data and calculations derived from testing of similar systems, provided that enough information is available to demonstrate similarity of function and design.

3. *Component compatibility considerations.* Ideally, a personal fall protection system is designed, tested, and supplied as a complete system. However, it is common practice for lanyards, connectors, lifelines, deceleration devices, body belts and body harnesses to be interchanged since some components wear out before others. The employer and employee should realize that not all components are interchangeable. For instance, a lanyard should not be connected between a body belt (or harness) and a deceleration device of the self-retracting type since this can result in additional free fall for which the system was not designed. In addition, positioning device components, such as pole straps, ladder hooks and rebar hooks, should not be used in a fall arrest system unless they meet the requirements of § 1910.129. Also, a ladder hook may not be used with a dee-ring, nor in a system which would permit any significant free fall distance (more than two feet (0.61 m)). Rebar hooks should be sized and used to be compatible with the size of rebar to which they will be attached. Any substitution or change to a personal fall protection system should be fully evaluated or tested by a competent person to determine that it meets the standard, before the modified system is put in use.

4. *Employee training considerations.* OSHA recommends that before the equipment is used, employees should be trained in the application limits; proper anchoring and tie-off techniques, including determination of elongation and deceleration distance; methods of use; and inspection and storage of the system. Careless or improper use of the equipment can result in serious injury or death. Employers and employees should become familiar with the material in this standard and appendix, as well as manufacturers' recommendations, before a system is used. Of uppermost importance is the reduction in strength caused by certain tie-offs (such as using knots, tying around sharp edges, etc.) and maximum permitted free fall distance. Also to be stressed are the importance of inspections prior to use, the limitations of the equipment, and unique

conditions at the worksite which may be important in determining the type of system to use.

5. *Instruction considerations.* Employers should obtain comprehensive instructions from the supplier as to the system's proper use and application, including, where applicable:

- a. The force measured during the sample force test;
- b. The maximum elongation measured for lanyards during the strength test;
- c. The deceleration distance measured for deceleration devices during the force test;
- d. Caution statements on critical use limitations;
- e. Application limits;
- f. Proper hook-up, anchoring and tie-off techniques, including the proper dee-ring or other attachment point to use on the body belt and harness for fall arrest;
- g. Proper climbing techniques;
- h. Methods of inspection, use, cleaning, and storage; and
- i. Specific lifelines which may be used. This information should be provided to employees during training.

6. *Inspection considerations.* OSHA recommends that personal fall protection systems must be regularly inspected. Any component with any significant defect, such as cuts, tears, abrasions, mold, or undue stretching; alterations or additions which might affect its efficiency; damage due to deterioration; contact with fire, acids, or other corrosives; distorted hooks or faulty hook springs; tongues unfitted to the shoulder of buckles; loose or damaged mountings; non-functioning parts; or wearing or internal deterioration in the ropes must be withdrawn from service immediately, and should be tagged or marked as unusable, or destroyed.

§ 1910.129 Personal fall arrest systems.

1. *Special considerations.* As required by the standard, when personal fall arrest systems are used, special consideration must be given to rescuing an employee should a fall occur. The availability of rescue personnel, ladders or other rescue equipment should be evaluated. In some situations, equipment which allows employees to rescue themselves after the fall has been arrested may be desirable.

2. *Tie-off considerations.* Employers and employees should at all times be aware that the strength of a personal fall arrest system is based on its being attached to an anchoring system which does not significantly reduce the strength of the system (such as an eye-bolt/snap-hook anchorage). Therefore, if a means of attachment is used that will reduce the strength of the system, that component should be replaced by a stronger one, but one that will also maintain the appropriate maximum deceleration characteristics. The following is a listing of some known strength reduction situations.

- a. *Tie-off using a knot in the lanyard or lifeline (at any location).* The strength of the line can be reduced by 50 percent, or more, if a knot is used. Therefore, a stronger lanyard or lifeline should be used to compensate for the knot, or the lanyard length should be reduced (or the tie-off