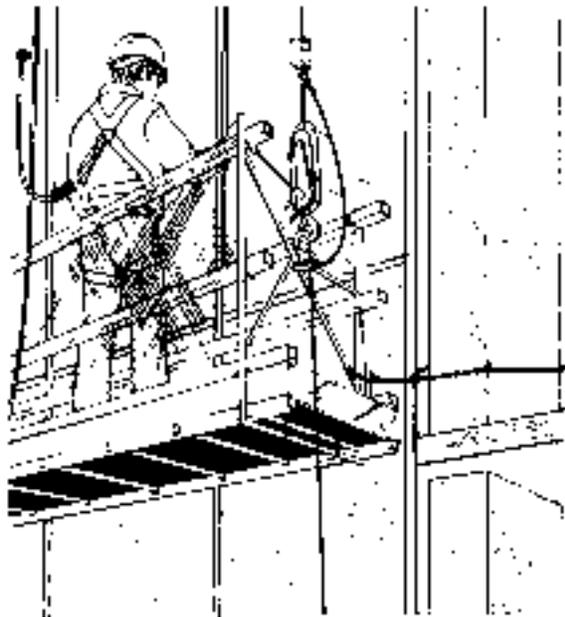

IUPAT Student Manual For Fall Protection Awareness Training



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IUPAT JATF FALL PROTECTION AWARENESS TRAINING

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1

INTRODUCTION TO FALL PROTECTION

The dictionary defines the term-FALL “as to drop or come down without restraint under the influence of weight or gravity”. In the construction industry falls are the leading cause of worker fatalities.

A TYPICAL WORKDAY

A TYPICAL WORKDAY

An average, 17 workers are killed each day, on the job, including:

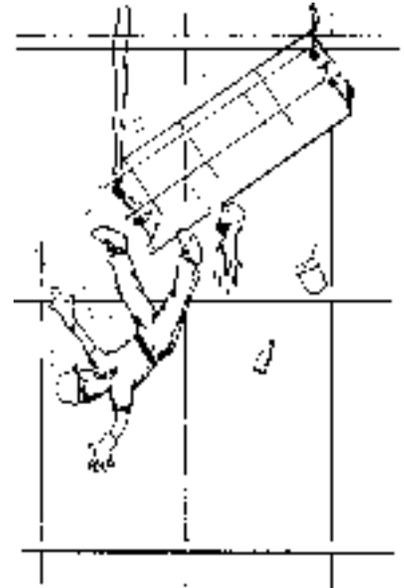
2 workers from falls, typically from a ladder, roof, or scaffold.

The U.S. Department of Labor, based on data from the Bureau of Labor Statistics, has listed falls as one of the leading causes of traumatic occupational death.

A NIOSH analysis of death certificates from work related injuries over a 10-year period has made it clear that falls are the leading cause of work related injury death among construction workers.

An OSHA study involving 99 fall-related fatalities suggests that virtually all of those deaths could have been prevented by the use of guardrails, body harnesses, safety nets, covers, or other means which would reduce employee exposure to the fall hazard.

OSHA recognizes that such accidents are, generally, complex events, involving a combination of factors. Accordingly, the Agency notes that a number of human and equipment-related issues must be addressed to protect employees from fall hazards. Among those issues are the following:



- ◆ The need to know where protection is required;
- ◆ The selection of fall protection systems which are appropriate for given situations;
- ◆ The proper construction and installation of safety systems;
- ◆ The proper supervision of employees;
- ◆ The implementation of safe work procedures; and
- ◆ The proper training in the selection, use, and maintenance of fall protection systems.

Based on its review of the incident data, OSHA has concluded that fall hazards pose a significant risk of death or serious injury for construction employees and that compliance with the requirements of 29CFR1926 Subpart M is reasonably necessary to protect employees from those hazards.

Falls from high places frequently cause serious injury or death. Fortunately, personal fall-protection equipment and other fall protection systems can prevent these casualties. Unfortunately, workers often fail to use the equipment and systems they have. Some workers use the proper equipment, but use it incorrectly. The Occupational Safety and Health Administration (OSHA) estimates that these mistakes kill many workers each year.

These deaths can be avoided but only if you, the individual worker, do your part. You're the one who must hook up or utilize a fall protection system, whenever there is any danger of a fall.

**THE VITAL
NEED FOR FALL
PROTECTION
PRODUCTS**

THE VITAL NEED FOR FALL PROTECTION PRODUCTS

Each year over 100,000 injuries and deaths are attributable to work-related falls. According to the National Safety Council, falls are one of the highest causes of death in the workplace. In addition to the lost lives and injuries caused by falls, businesses lose millions of dollars each year from significant increases in insurance premiums, workers' compensation claims, product liability costs, and other related expenses. In short, a comprehensive fall protection program not only saves lives and reduces injuries, but also saves money and makes good business sense.

**WHO'S
RESPONSIBLE**

WHO'S RESPONSIBLE

Regulatory agencies make it quite clear that it is the employer's responsibility to develop a fall protection program that complies with mandated regulations. The most effective programs are those where employers work closely with their workers to identify fall hazards and to jointly develop a comprehensive fall protection program that either eliminates fall hazards or provides appropriate protection against them.

It should be noted that regulatory agencies have steadily increased fines for noncompliance and negligence. Citations can be avoided, however, by those employers who take an active interest in their employees' well-being by developing an appropriate fall protection program.

Compliance is important, but even more important, a proper fall protection program can eliminate or seriously reduce on-the-job injuries and substantially reduce insurance costs and other related expenses.

WHY DOES OSHA HAVE A STANDARD FOR FALL PROTECTION

*Constructions' Fall
Standard 29cfr1926
Subpart M*

WHY DOES OSHA HAVE A STANDARD FOR FALL PROTECTION

In the construction industry in the U.S., falls are the leading cause of worker fatalities. Each year, on average, between 150 and 350 workers are killed and more than 100,000 are injured as a result of falls at construction sites. OSHA recognizes that accidents involving falls are generally complex events frequently involving a variety of factors. Consequently, the standard for fall protection deals with both the human and equipment-related issues in protecting workers from fall hazards. For example, employers and employees need to do the following:

- ◆ Where protection is required, select fall protection systems appropriate for given situations.
- ◆ Use proper construction and installation of safety systems.
- ◆ Supervise employees properly.
- ◆ Use safe work procedures.
- ◆ Train workers in the proper selection, use, and maintenance of fall protection systems.

The rule covers most construction workers except those inspecting, investigating, or assessing workplace conditions prior to the actual start of work or after all work has been completed.

The rule identifies areas or activities where fall protection is needed. These include, but are not limited to, ramps, runways, and other walkways, excavations, hoist areas, holes, form work and reinforcing steel, leading edge work, unprotected sides and edges, overhead bricklaying and related work, roofing work, precast concrete erection, wall openings, residential construction, and other walking/working surfaces. The rule sets a uniform threshold height of 6 feet (1.8 meters). This means that construction employers must protect their employees from fall hazards and falling objects whenever an affected employee is 6 feet (1.8 meters) or more above a lower level. The 6 foot rule sets a threshold height of 6 feet, thereby providing consistent protection. Protection also must be provided for construction workers who are exposed to the hazard of falling into dangerous equipment.

Under the standard, employers are able to select fall protection measures, compatible with the type of work being performed. Fall protection generally can be provided through the use of guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, and warning line systems, among others.

The OSHA rule clarifies what an employer must do to provide fall protection for employees, such as identifying and evaluating fall hazards and providing specific training. Requirements to provide fall protection for workers on scaffolds and ladders and for workers engaged in steel erection of buildings are covered in other Subparts of OSHA regulations.

NOTES

2

IDENTIFICATION OF FALL HAZARDS

Nationally and internationally, the International Union of Painters and Allied Trades (IUPAT) members are exposed to falls on virtually every job site from shopping malls to storage tanks and bridges. Falls are the number one cause of deaths and serious injuries to IUPAT members nationwide. In addition, falls are the number two cause of death in all industries nationwide. Each year 1,300 workers die in falls and 300,000 workers suffer disabling injuries. The reason being is that in order to ensure proper surface preparation, installation of glass, or application processes IUPAT workers must constantly work off ladders, swing stages, aerial lifts, and other various types of scaffolding. This, coupled with the lack of knowledge and training in fall protection of employers, supervisors and workers, is the prime causation of the many unnecessary deaths, citations, and injuries accruing on job site(s) daily.

Other contributing factors to the problem are the multiple job settings a worker may work at over a short period of time with each posing new and different fall hazards. Thus, the problem is two-fold in painting, glazing, dry wall finishing, and sign painting trades. On one hand, there is a group of small businesses which employ 25 or fewer employees trying to maintain a safe work place; meanwhile, on the other hand, workers are attempting to complete a days work with the risk of these many and various fall hazard exposures. These problems create an immediate need for fall protection training, both in the classroom and in the field. Workers, supervisors and heads of the companies that employ them, need to be involved in the training process in order to ensure a comprehensive, focused understanding of the types of fall protection needed to protect workers from serious injuries and death with emphasis on fall hazards recognition.

Falls from high places frequently cause serious injury or death. Fortunately, personal fall-protection equipment can prevent these casualties. Unfortunately, workers often fail to use the equipment they have. Some workers use the proper equipment, but use it incorrectly. The Occupational Safety and Health Administration (OSHA) estimates that these mistakes kill 300 people each year. These deaths can be avoided but only if you, the individual worker, do your part. It may be the employer's responsibility but, you're the one that must protect yourself with the best fall protection system whenever there is any danger of a fall.

Taking a fall on the ground can result in an injury, no matter what caused the accident. But falls from heights of more than 6 feet can often be life threatening. It doesn't matter whether you tripped over a stationary object or slipped on a wet surface; losing your balance when you're above the ground can be more than hazardous to your health. It must be pointed out that even when fall protection equipment is used, workers are killed because of improper use such as failing to tie off correctly. But that's not all. Lack of guard rails and safety netting, improper erection of scaffolding, lack of barricades around openings or holes in floors that includes, elevator shafts, window openings, or stairwells and/or poor housekeeping that leaves tools, debris, and supplies lying around all contribute to a hazardous fall environment.

What can you do? Prevention should always be the first step. Store materials and tools to prevent tripping hazards, and clean up spills and debris so that workers won't slip. See that safety netting is installed properly. Inspect scaffolding to ensure that it's erected securely and correctly. If barricades or guard rails are needed around shafts, openings or edges, see that they're put up and that they're solid enough not to collapse under weight. Most important work towards 100% fall protection.

The second step to preventing accidents is education and training. Teach your crew members how to make sure that their personal protective equipment (PPE) is in good working condition. Show them how to inspect the equipment. Techniques in proper erection, work practices, and proper tie-off methods, including always tying off from above, should also be stressed.

First and foremost an understanding of possible fall hazards must be addressed before work ever begins. This pro-active stance can help eliminate falls before they happen. With labor and management working together for safer job-sites productivity can increase and workers will live healthier and longer lives.

Appendix A

3

OVERVIEW OF OSHA / EMPLOYER & EMPLOYEE RESPONSIBILITY



OSHA

More than 90 million Americans spend their days on the job. They are our most valuable national resource. Yet, until 1970, no uniform and comprehensive provisions existed for their protection against workplace safety and health hazards.

In 1970, the Congress considered annual figures such as these:

Job related accidents accounted for more than 14,000 worker deaths.

Nearly 2 ½ million workers were disabled.

Ten times as many person-days were lost from job-related disabilities as from strikes.

Estimated new cases of occupational diseases totaled 300,000.

In terms of lost production and wages, medical expenses and disability compensation, the burden on the nation's commerce was staggering. Human cost was beyond calculation. Therefore, the Occupational Safety and Health Act of 1970 (the Act) was passed by a bipartisan Congress “. . . to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources.

OSHA'S PURPOSE

OSHA'S PURPOSE

Under the Act, the Occupational Safety and Health Administration (OSHA) was within the Department of Labor to:

Encourage employers and employees to reduce workplace hazards and to implement new or improve existing safety and health programs;

Provide for research in occupational safety and health to develop innovative ways of dealing with occupational safety and health problems;

Establish “separate but dependent responsibilities and rights” for employers and employees for the achievement of better safety and health conditions;

Maintain a reporting and recordkeeping system to monitor job-related injuries and illnesses;

Establish training programs to increase the number and competence of occupational safety and health personnel;

Develop mandatory job safety and health standards and enforce them effectively; and

Provide for the development, analysis, evaluation and approval of state occupational safety and health programs.

While OSHA continually reviews and redefines specific standards and practices, its basic purposes remain constant. OSHA strives to implement its mandate fully and firmly with fairness to all concerned. In all its procedures, from standards development through implementation and enforcement, OSHA guarantees employers and employees the right to be fully informed, to participate actively and to appeal actions.

OSHA ACT

OSHA ACT

Public Law 91-596

91st Congress, S. 2193

December 29, 1970

As Amended by Public Law 101-552

Para. 3101, November, 1990

General Duty Clause

Duties

Section 5. (A) Each employer-

- (1) shall furnish to each Of his/her employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.
- (2) shall comply with occupational safety and health standards promulgated under this Act.

Section 5. (B) Each employee-

Shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his/her own actions and conduct.

DISCRIMINATION

DISCRIMINATION

Section 11 (c)

- (1) No person shall discharge or in any manner discriminate against any employee, because such employee has filed any complaint or instituted or caused to be instituted any proceeding under or related to this Act or has testified or is about to testify in any such proceeding or because of the exercise by such employee on behalf of himself or others of any right afforded by this Act.
- (2) Any employee who believes that he has been discharged or otherwise discriminated against by any person in violation of this subsection may, within *thirty days* (30) after such violation occurs, file a complaint with the Secretary alleging such discrimination. The employer can not fire, demote, or discriminate against you for filing an OSHA Complaint, bring Safety & Health Hazards to the attention of the Employer, Union or other Employees.

The Secretary will go to District Court to get your job back with back pay and benefits. This process is very slow and the Employee must first exhaust a Grievance Procedure if one exists.

STATE JURISDICTION AND STATE PLANS

STATE JURISDICTION and STATE PLANS

Section 18

- (a) Nothing in this Act shall prevent any State agency or court from asserting jurisdiction under State law over any occupational safety or health issue with respect to which no standard is in effect under section 6.
- (b) Any State which, at any time, desires to assume responsibility for development and enforcement therein of occupational safety and health standards relating to any occupational safety and health issue with respect to which a Federal standard has been promulgated under section 6 shall submit a State plan for the development of such standards and their enforcement.
- (c) The Secretary shall approve the plan submitted by a State under subsection (b), or any modification thereof, if such plan in his judgement. This Section allows States to set up their own State Occupational Safety and Health Programs, subject to the Federal Occupational Safety and Health Administration (OSHA) approval. There are 25 State/Territory Plans.

These State Plans may have more strict regulations than OSHA. If you are in a State Plan State check the State Safety and Health Regulations.

**29CFR 1926
SUBPART C
DEFINITIONS**

29CFR 1926 SUBPART C

Definitions

Competent Person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Qualified Person means one who, by possession of a recognized degree, certificate, or professional standing or who be extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.

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4

TYPES OF FALL PROTECTION

WHAT IS FALL PROTECTION ?

Fall protection is a combination of methods and devices used to prevent workers from falling off, onto, or through working levels. Fall protection also includes methods and devices that protect workers from being struck by falling objects.

DUTY TO HAVE FALL PROTECTION

DUTY TO HAVE FALL PROTECTION

The OSHA standard prescribes the duty to provide fall protection, sets the criteria and practices for fall protection systems, and requires training. It covers hazard assessment and fall protection and safety monitoring systems. Also addressed are controlled access zones, safety nets, guardrail, personal fall arrest, warning line, and positioning device systems. These can be broken into three distinct areas-1. Fixed protection systems, 2. Positioning and fall arrest systems, and 3. Safety monitoring systems.

Employers are required to assess the workplace to determine if the walking/working surfaces on which employees are to work have the strength and structural integrity to safely support workers. Employees are not permitted to work on those surfaces until it has been determined that the surfaces have the requisite strength and structural integrity to support the workers. Once employers have determined that the surface is safe for employees to work on, the employer must select one of the options listed for the work operation if a fall hazard is present.

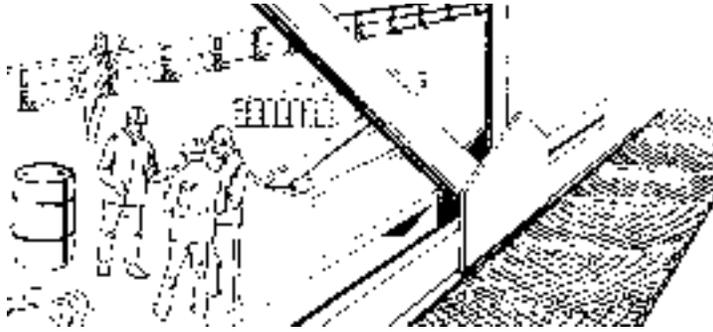
NOTE: The distance from the edge is not considered a form of fall protection

For example, if an employee is exposed to falling 6 feet or more from an unprotected edge, the employer must select either a guardrail system, safety net system, or personal fall arrest system to protect the worker.

FIXED PROTECTION SYSTEMS

FIXED PROTECTION SYSTEMS

SAFETY NET SYSTEMS Safety nets may be installed to protect you from falls. The net will be installed and tested before its use. A 400 lb bag of sand 30" x 2" will be dropped from the highest level from which a fall hazard exists. The net must prevent contact with the lower level or objects. Defective nets will be removed from service. Nets that are repaired or are left in place for more than 6 months must be retested.



Safety Net System

Inspect nets weekly for wear, damage, and other deterioration. Remove defective nets from service. Make sure that scrap, tools and other materials that fall into the net are removed as soon as possible. The net should be as close as possible to your working level. Do not work on levels more than 30 feet above the net.

GUARDRAILS SYSTEMS

GUARDRAILS

Guardrails are frequently used to provide fall protection. Make sure that they have been installed properly before working on an elevated surface. Never lean on guardrails.

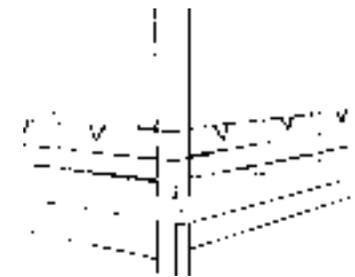
NOTE: If guardrails are removed for handling equipment or material; the guardrails must be replaced upon completion.

The Guardrail System must be about 42 inches (+ or - 3") above the walking/ working level. When necessary the height of the top edge may be increased. For example, if workers are using stilts, the top rail must be increased equal to the height of the stilts. All guardrails must be able to withstand 200 lbs of pressure. Guardrail cannot deflect downward to less than 39 inches when 200 lbs. is applied .

Mid-rails must be installed midway between the working level and the guardrail. It should be able to withstand 150 lbs of pressure. Screens, mesh, or other structural members must be installed between the top edge of the guardrail system and the walking/ working surface when there is no wall or parapet wall at least 21 inches high. These structures must withstand 150 lbs. of pressure.

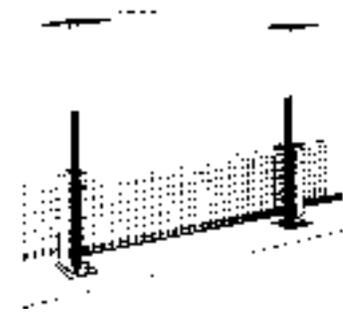


Wooded Guardrail



Wire Rope Guardrail System

Make sure that the guardrails do not pose additional hazards. Guardrail system surfaces must be smooth to prevent punctures, lacerations, and snagging of clothing. Edges or connections must not extend into the work area and cause a projection hazard. Steel banding and plastic banding cannot be used for top rails or mid-rails. If rope is used for top rails, place high-visibility flags every 6-feet.



Manufactured Safety Fences

Hoisting areas and holes pose special problems. Make sure that a chain, gate or removable guardrail is secured when you are not hoisting material. All unprotected sides or edges of a hole must be protected.

When holes are used for the passage of materials, not more than two sides of the guardrail system can be removable. When the hole is not being used, place a cover over the hole or replace all sections of the guardrail system. Covers should be marked "HOLE" or "COVER." Holes that are used as a ladder access must have a gate. Make sure the gate is in place when the ladder is not in use.



Protection for Floor Openings

Wood, pipe or structural steel can be used for guardrail systems. If wood is used, the specifications listed should be followed. Wood components shall be a minimum 1500 lb-ft/in² fiber (stress grade) construction grade lumber; the posts shall be at least 2" x 4" lumber, the top rail shall be at least 2" x 4" lumber, the intermediate rail shall be at least 1" x 6" lumber. All lumber dimensions are nominal sizes.

If pipe is used, these specifications should be followed. Posts, top rails, and intermediate railings shall be at least one and one-half inches nominal diameter (schedule 40 pipe) with posts spaced not more than 8' apart on centers.

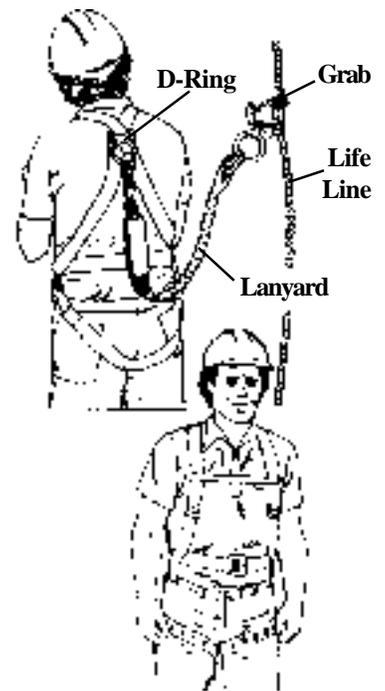
If structural steel railings are used, these specifications should be followed. Posts, top rails, and intermediate rails shall be at least 2" x 2" by 3/8" angles, with posts spaced not more than 8' apart on centers.

POSITIONING AND FALL ARREST SYSTEMS

NOTE: Max arresting force permitted (1800 lbs.) Unless a shock absorbing lanyard is used when free fall distances is 6 feet.

POSITIONING AND FALL ARREST SYSTEMS

A PERSONAL FALL ARREST SYSTEM is used to stop an employee from falling more than 6 feet. It consists of an anchorage point, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or combinations of these. The body harness consists of straps around the waist, torso, shoulders, and legs which attaches to a lanyard, lifeline, or deceleration device. All fall and weight forces are absorbed and distributed over the thighs, pelvis, waist, chest and shoulders. The lanyard, a flexible line of rope, wire rope, or strap, allows connection of a body harness to a deceleration device, lifeline, or anchorage. There are two types of lifelines. A vertical lifeline consists of a flexible line for connection to an anchorage at one end to hang vertically. Each employee must have a separate vertical lifeline. A horizontal lifeline connects to anchorages at both ends. It stretches horizontally and serves as an anchorage for other parts of the system. A body belt cannot be used as fall protection.

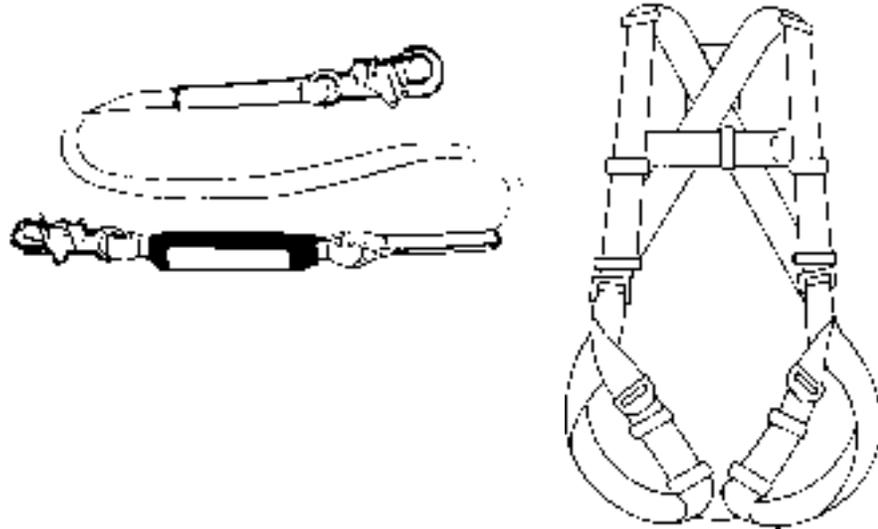


Full Body Harness

A POSITIONING DEVICE SYSTEM is a body belt or body harness rigged to support an employee while working on a vertical surface, such as a wall. It consists of the same basic components as a fall arrest system. However, it must limit fall distance to two feet. Neither personal fall arrest systems or positioning devices may be used for hoisting materials.

MATCH PERSONAL FALL PROTECTION SYSTEM TO THE PARTICULAR WORK SITUATION. 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 may be present. Make sure you are aware of rescue procedures if a fall occurs. (See Chapter 14)

PROTECT LANYARDS, CONNECTORS, AND LIFELINES. FROM DAMAGE CAUSED BY WORK OPERATIONS such as welding, chemical cleaning, and abrasive blasting. Protection from seasonal weather changes must also be considered. Monitor the system's effectiveness. Clean and maintain the system as necessary.



MAKE SURE ALL COMPONENTS ARE MADE TO WORK WITH EACH OTHER. Not all parts are compatible. Any substitutions or changes to a personal fall arrest system should be fully evaluated or tested by a competent person.

INSPECT PERSONAL FALL ARREST SYSTEMS BEFORE EACH USE. Check for 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. Any component with a significant defect or other wear, such as cuts, tears, abrasions, mold, or undue stretching is defective. Alterations, exposure to fire or corrosives might also affect its ability to protect you. Tag or mark defective systems as unusable, or destroy them. Personal fall arrest systems that have been subject to an impact from falling must also be removed from services.

USE AN APPROPRIATE ANCHORAGE POINT. One of the most important aspects of personal fall protection systems is anchorage points. Anchorage points used for PFAS shall be capable of supporting at least 5000 pounds per worker. Anchorage points for positioning devices must support at least twice the potential impact load of an employee's fall or 3000 pounds.

The following describes anchorage points which may be used if they meet the requirements of the standard. Anchorage points built into the structure may be used during construction, as well as afterwards. Anchorage may be installed prior to use by a registered professional engineer or other qualified person. In some cases, the anchor point may be existing structures. Steel members or I-beams may be used if an acceptable strap is available for the connection (do not use a lanyard with a snaphook clipped onto itself). Guardrails or railings may be used if, they have been designed for use as an anchor point. Masonry or wood members can only be used if the attachment point is substantial and precautions have been taken to assure that bolts or other connectors will not pull through. Make sure that you have confirmed the use of all anchor points with a not pull through. Make sure that you have confirmed the use of all anchor points with a qualified person.

USE A TIE-OFF THAT DOES NOT REDUCE THE EFFECTIVENESS OF THE SYSTEM. A knot in a rope lanyard or lifeline can reduce the strength of the system by 50 percent or more. When placed around an “H” or “I” beam its strength may be reduced as much as 70 percent; Compensate for strength reduction or use materials which will provide the proper protection. For example, use a webbing lanyard or wire core lifeline around the beams.

NOTE: Always minimize free fall distance. APFAS shall be anchored, rigged or tied off so a worker cannot fall more than 6 feet, contact a lower level nor any other objects.

The angle of attachment to a horizontal lifeline can also reduce the strength of a system. When the angle of horizontal lifeline sag is less than 30 degrees, the impact force on the lifeline by a lanyard is increased greatly. For example, with a sag angle of 5 degrees, the force is about 2:1. At 15 degrees sag, it is about 6:1. Extreme care should be taken in considering a horizontal lifeline for multiple tie-offs. If one employee falls, the movement of the falling employee and the horizontal lifeline may cause other employees to fall. Horizontal lifeline and anchorage strength should be increased by at least 5000 lbs for each additional employee to be tied off. The design of systems using horizontal lifelines must only be done by qualified persons.

The strength of an eye-bolt is rated along the axis of the bolt and its strength is greatly reduced if the force is applied at an angle to this axis (in the direction of shear). Also, care should be exercised in selecting the proper diameter of the eye to avoid accidental disengagement of snap-hooks not designed to be compatible for the connection.

Due to the significant reduction in the strength, the sliding hitch knot (prusik) should not be used for lifeline/lanyard connections. The “one-and-one” sliding hitch knot should never be used. The “two-and-two,” or “three-and-three” knot may be used in emergency situations. However, care should be taken to limit free fall distance to a minimum.

Other factors involved in a proper tie-off are elongation and deceleration distance. During the arresting of a fall, a lanyard will experience a length of stretching or elongation. The additional stopping distance may be very significant. Check total distance with vendor. Consider the hazard of obstructions when determining location of the tie-offs. Also consider tie-offs which minimize the possibilities of exaggerated swinging.

SAFETY MONITORING SYSTEMS

SAFETY MONITORING SYSTEMS

In order to perform some operations, the usual methods to provide fall protection (guard rails, safety nets, etc.) are not possible. This may occur when work involves leading edge work, precast concrete erection work, overhand bricklaying or related work, or residential construction work. During these operations controlled access zones and a safety monitoring system will be established. A Fall Protection Plan will be established for each jobsite where these types of fall protection are used. The plan will be reviewed with you before you begin work on that particular job.

CONTROLLED ACCESS ZONE

Controlled access zones are areas in which certain work (e.g., unprotected or leading edge) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled. The controlled access zone shall be defined by a control line or other means that restricts access. The line will be setup between 6 feet and 25 feet from the unprotected or leading edge. If precast concrete members are being erected, the control line may be between 6 feet and 60 feet or half the length of the member being erected. The control line will be setup parallel along the entire length of the unprotected or leading edge. It will be connected on each side to a guardrail system or wall. Control lines shall consist of ropes, wires, tapes, or equivalent materials, and supporting stanchions. Each must be flagged or clearly marked at not more than 6' intervals with high visibility material. It must be rigged from a low point of 39", and a high point of 45". Control lines shall be strong enough to sustain stress of not less than 200 pounds.

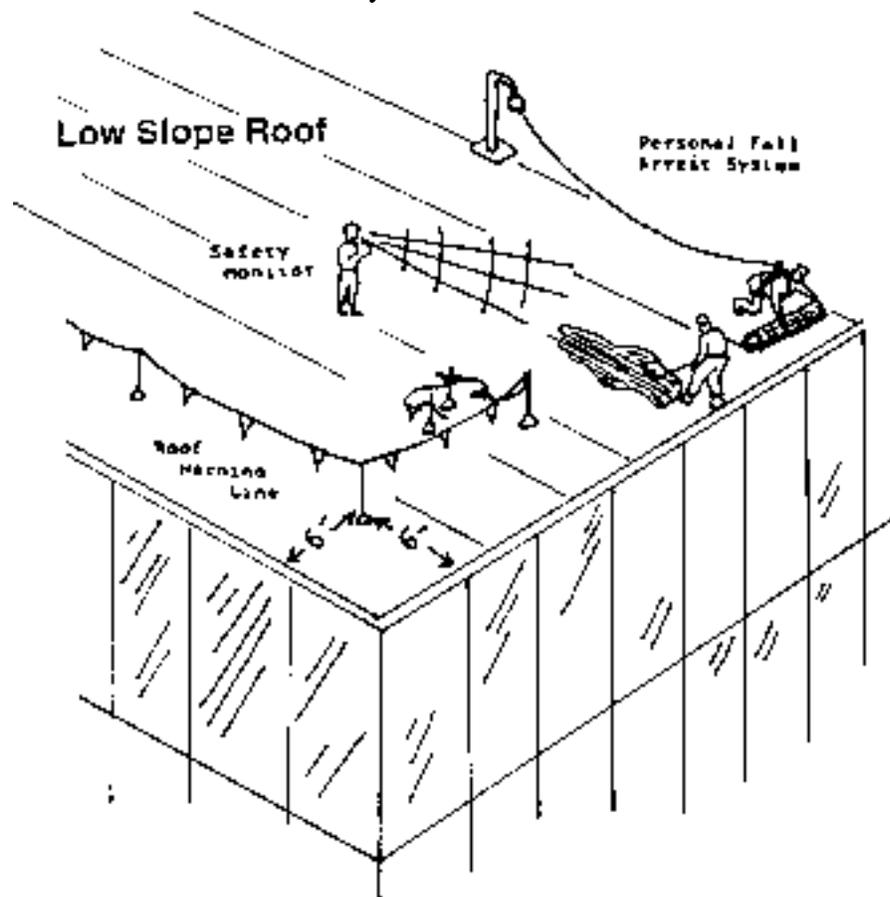
For jobs which involve overhand bricklaying and related work, the controlled access zone will be defined by a control line erected between 10 feet and 15 feet from the working edge. The control line must be setup to enclose all employees performing overhand bricklaying and related work at the working edge. Additional control lines will be erected at each end to enclose the controlled access zone.

Do not enter the controlled access zone unless you are required to perform work in that area and have authorization.

SAFETY-MONITORING SYSTEM A Safety-monitoring system requires that a competent person is responsible for recognizing and warning employees of fall hazards. The competent person designated will monitor your safety while working in areas where fall hazards are present. You must comply with his or her instructions. The competent person has been trained to recognize fall hazards. Do not ask the monitor to perform other duties. The competent person must be on the same walking/working surface and be within visual sighting distance of all employees being monitored. In addition, he or she must be able to communicate orally with all employees being monitored.

When safety monitoring systems are used other precautions must be followed. Do not store or use mechanical equipment in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs. Do not enter areas where other employees are engaged in roofing work [on low-sloped roofs], covered by a fall protection plan, or being protected by a safety monitoring system. All employees must follow the instructions of a safety monitor.

NOTE: No worker other than an employee engaged in low sloped roofing work or an employee covered by a fall protection plan shall be allowed in an area where the worker is being protected by a safety monitoring system.



Safety-Monitoring System

FALL PROTECTION REFERENCE SUMMARY

FALL PROTECTION REFERENCE SUMMARY

FALL HAZARDS

WORKING SURFACE

unprotected sides & edges
leading edge
hoist areas

excavations
roofing low-sloped

steep roofs
ramps, runways, walkways
holes

formwork/reinforcing steel
overhand laying of brick
precast concrete
residential construction
wall openings

dangerous equipment

CONSTRUCTION

guardrail, net, Personal Fall Arrest System (PFAS)
guardrail, net, PFAS or fall protection plan
guardrail, PFAS (employee working through opening or access must have PFAS)

guardrails, fences, barricades or covers
guardrail, net, PFAS or a warning line combined with another system

guardrail, net, PFAS

guardrails

covers, PFAS, guardrail

PFAS, net, positioning device

guardrail, net, PFAS, CAZ

guardrail, net, PFAS fall protection plan

guardrail, net, PFAS, fall protection plan

guardrail, net, PFAS

guardrail, net, PFAS

NOTE: Fall Protection Plan is only available to employee’s engaged in leading edge work, precast concrete erection or residential construction.

FIXED PROTECTION SYSTEMS

SAFETY NET SYSTEMS

- Test safety nets before use and as needed.
- Inspect nets weekly.
- Defective nets will be repaired or removed from service.
- Remove scrap, tools etc. from net as soon as possible.
- Do not work on levels more than 30 feet above the net

GUARDRAILS

- Make sure that guardrails have been installed properly.
- Never lean on guardrails.
- Make sure that guardrails don’t pose other hazards.
- Make sure that a chain, gate or removable guardrail is secured when you are not hoisting material.
- Place a cover over holes or replace all sections of the guardrail system. Mark covers “Hole” or “Cover”.
- Make sure the gate is in place when the ladder access or access is not in use.

POSITIONING AND FALL ARREST SYSTEMS

PERSONAL FALL ARREST SYSTEM

- Match personal fall protection system to the particular work situation.
- Before purchasing or using a personal fall arrest system, make sure it has met testing requirements.
- Make sure all components are made to work with each other.
- Inspect personal fall arrest systems before each use.
- Use an appropriate anchorage point.
- Use a tie-off that does not reduce the effectiveness of the system.

SAFETY-MONITORING SYSTEM

SAFETY-MONITORING SYSTEM

- The employer designates a competent person to monitor your safety.
- Comply with instructions from the safety monitor.

CONTROLLED ACCESS ZONE

- Area in which certain work may take place without the use of standard fall protection
- Do not enter the controlled access zone unless you perform work in that area and have authorization.

5

SAFE WORK PRACTICES

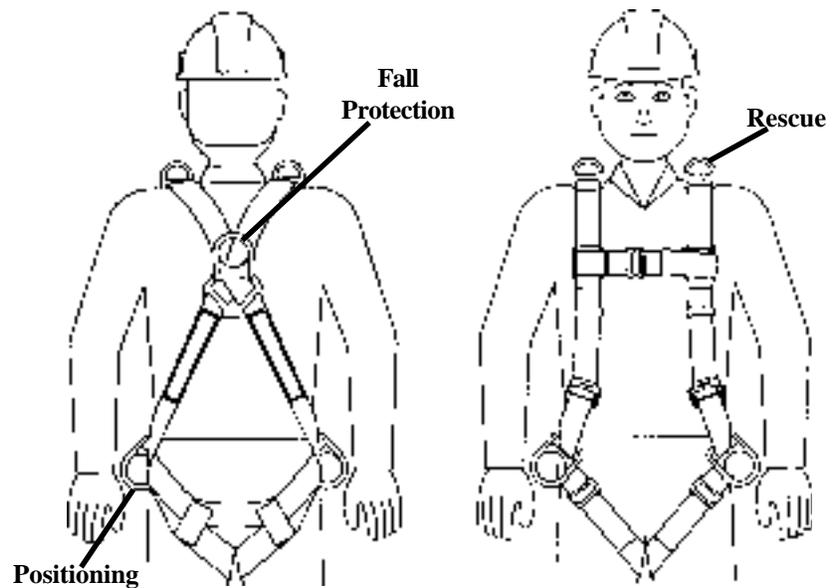
General Fall Protection Recommendations

The following items are recommended to provide maximum protection of workers and ensure compliance with regulations and standards. All work environments are different, so the following are guidelines only.

- A. Warnings, Labels, and Instructions: Always read all labels, instructions, and warnings contained on and in the product packaging before using any fall protection equipment.
- B. Inspection: All fall protection equipment should be inspected prior to use by worker.
- C. Training: All workers should be trained by a competent person in the proper use of fall protection systems and equipment.
- D. Regulations: Understand all Federal, State and Local regulations pertaining to fall protection before using fall protection equipment.
- E. Rescue Pre-Planning: Minimizing the time between a fall occurrence and medical attention of the workers is vitally important. A thorough rescue program should be established prior to using fall protection equipment. Employers should provide for a prompt rescue should a fall occur. Rescue procedures should be reviewed on a regular basis as part of the company's overall safety training program.
- F. Equipment Preferences: If there are any doubts about which fall protection product to use, choose the following basic system:
 1. Full-Body Harness with Sliding Back D-Ring; Should a fall occur, the body harnesses will distribute the load throughout the body instead of concentrating the forces on the abdomen, as is the case with traditional body belts. The sliding back D-ring will keep the worker in an upright position in the event of a fall, which allows the worker to remain as comfortable as possible while awaiting a rescue.



NOTE: Students must demonstrate what they have learned on the jobsite and may need to be retrained.



2. Shock-Absorbing Lanyards with Locking Snap Hooks—Lanyards with built-in shock absorbers reduce fall arresting forces by 65-80% compared to forces generated by traditional lanyards. Locking snaps feature self-closing, self-locking keepers which remain closed until unlocked and pressed open for connection or disconnection. This feature of locking snaps significantly reduces the possibility of accidental disengagement or “rollout.”
3. Reliable Anchorage Points Anchor points and attachments must be capable of supporting 5000 lbs. per worker. If there is any doubt about the strength of the anchor and/or attachment point **DO NOT ATTACH**. Search for an alternative anchor point and select a proper attachment device.

G. Proper Anchor Connecting Procedures:

1. When using a full-body harness, connecting devices should be attached to the D-ring in the middle of back. When using a body belt for positioning, connecting devices should be attached to the Side D-rings only, not to be used for fall arrest or protection.
2. Always keep free-fall distance to 6 feet or less. If using a six-foot or shorter lanyard, attach at or above the level of your back D-ring.

Workers must also attach to an anchor point in a manner that ensures no lower level is struck during a fall. This is especially important when utilizing shock absorbers as these devices may elongate as much as 3-1/2 feet during the shock-absorption process. A worker of average height utilizing a 6-ft. shock-absorbing lanyard in conjunction with a sliding back D-ring must attach to an anchor point at least 15-1/2 feet from a lower level. If workers must attach at a lesser height, shorter lanyards or alternate forms of connecting devices must be utilized.

PROPER ANCHOR ATTACHMENT PROCEDURE



- 6 ft. Average height of worker
- 6 ft. Lanyard length
- 3-1/2 ft. Maximum shock absorber extension
- 15-1/2 ft. Maximum fall from anchor point

The Fall

- * At first, before fall-arrest equipment begins to work, the person is in free fall.
- * After a certain free-fall distance, the system activates.
- * It then takes more distance, called the deceleration distance, to bring the person to a full stop.
- * Force is needed to stop a fall.

Fall-Arrest Force

- * Fall-arrest force hits the body through the straps of the belt or harness. If the equipment is not worn properly, this sudden jolt can damage the spine or internal organs.
- * A deceleration system helps to absorb the fall-arrest force.
- * Body harnesses distribute the force to areas of the body that are protected by bones.

NOTE: Make up of the lanyard can impact the deceleration distance. (e.g., rope, nylon)

3. Do not connect your cross-arm strap around sharp or rough edges.
- H. System Components: Only components that are fully compatible with one another should be used. Fall arrest systems are designed and tested as complete systems and should be used in this way.
 - I. What to Do After a Fall: If a fall occurs, all components of the fall arrest system should be removed from service.

**SAFE WORK
PRACTICES
REVIEW****SAFE WORK PRACTICES REVIEW****KNOW WHAT TYPE OF FALL PROTECTION EQUIPMENT IS REQUIRED:**

- Anytime you're working off the slab, you should wear a full body harness with a shock absorbing lanyard/deceleration device.
- Only double locking shock absorbing lanyards/deceleration devices are allowed on job sites, no other lanyards will be allowed.

HANDLE AND STORE TOOLS AND MATERIALS SECURELY:

- Tell your supervisor if your equipment is damaged.
- Carry hand tools in tool belts to elevated work surfaces.
- Raise tools too large for the tool belt, use a rope and pulley for surfaces over six feet.
- Secure tools and materials from falling to lower levels when working at or over the edge of the floor slab or on a scaffold.

PROTECT WORKERS AND THE PUBLIC:

- Use warning signs and/or tape to secure the area.(see chapter 14)
- Be sure your scaffolding has decking to protect people passing below.
- Be sure a screen is installed between the toe-board and guardrail of your scaffold when work is going on below.

REMOVE INJURED WORKERS PROMPTLY AND SAFELY:

- All situations are different, use your best judgment.
- If the fallen worker is conscious, anchor a second lifeline and send it down to be attached to the full body harness.
- Send for help.

USE FALL RESTRAINT AND ARREST SYSTEMS CAREFULLY

- Inspect all components of your fall restraint system before you use it, including perimeter cables, clamps retractable lanyards. etc.
- Use only devices designed for your fall restraint system.
- Anchor your system securely to objects capable of supporting at least 5,000 lbs.
- Rig the system to allow your movement only as far as the sides and edges of your walking or working surface.

OBSERVE THESE PRECAUTIONS WITH EQUIPMENT

- Inspect the harness for mildew, wear, damage, or other deterioration and remove any defective component from use if its function or strength has been impaired.
- When your system components have been subjected to impact loading, remove them from service immediately for inspection by qualified personnel.
- Protect all equipment from cuts and abrasions.
- Rig your system to allow a maximum free fall of 6 feet.
- Attach only one worker to a vertical lifeline or dropline.
- Do not tie knots in a lanyard.
- Avoid connecting snap-hooks to each other or to loops made in webbing-type lanyards, and connect no more than one snap-hook to any one D-ring.

INSPECT YOUR BELT, HARNESS, AND LANYARD DAILY

1. Beginning at one end, grasp the belt with your hands six to eight inches apart.
2. Bend the strap or lanyard so it makes a “U” pointing toward the ground.
3. Look for frayed edges, broken fibers, pulled stitches, cuts, or chemical damage. Look from all angles.
4. Move along until the entire surface has been checked.
5. Check the hardware (buckles, rivets, snaps, D-rings, rivets, eyelets). Look for pieces that look worn, weak, cracked, corroded, loose, bent, or contain sharp edges.

CLEAN YOUR FALL PROTECTION EQUIPMENT

1. Wipe off all surface dirt with a damp sponge.
2. Squeeze the sponge dry.
3. Dip the sponge in a mild solution of water and soap and apply in a vigorous back and forth motion.
4. Wipe the strap dry with a clean cloth and hang to dry away from excess heat or sunlight.



For heavy dirt or grease, soak belts in a solution of one tbs. of grease cutter to one gallon of water, rinse, and hang to dry.

HARNESS/BODY BELT INSPECTION

To inspect your harness, perform the following procedures for all harness straps

1. Webbing

Grasp the webbing with your hands 6 to 8 inches apart. Bend the webbing in an inverted “U” as shown. The surface tension resulting makes damaged fibers or cuts easier to see. Follow this procedure the entire length of the webbing, inspecting both sides of each strap. Watch for frayed edges, broken fibers, pulled stitches, cuts, burns, and chemical damage.



2. D-Ring/Back Pads

Check D-rings for distortion, cracks, breaks, and rough or sharp edges. The d-ring should pivot freely. D-ring back pads should also be inspected for damage.



3. Attachment of Buckles

Attachments of buckles and D-rings should be given special attention. Note any unusual wear, frayed or cut fibers, or distortion of the buckles or D-rings.



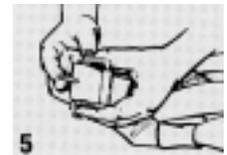
4. Tongue/Grommets

The tongue receives heavy wear from repeated buckling and unbuckling. Inspect for loose, distorted or broken grommets. Webbing should not have additional punched holes.



5. Tongue Buckle

Buckle tongues should be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. Roller should turn freely on frame. Check for distortion or sharp edges.



6. Friction and Mating Buckles

Inspect the buckle for distortion. The outer bars and center bars must be straight. Pay special attention to corners and attachment points of the center bar.



6

PERSONAL PROTECTIVE EQUIPMENT

With fall protection we cannot forget other areas of possible injury and the need for protection. Hard hats, goggles, face shields, earplugs, and steel-toed shoes or boots: What do all these items have in common? They are all various forms of personal protective equipment (PPE), designed to protect workers from injury and illness.

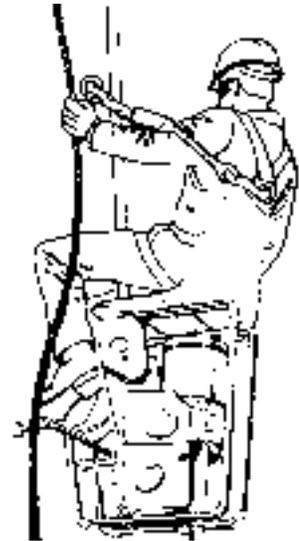
Yet, data from the Bureau of Labor Statistics show:

- Hard hats were worn by only 16% of those workers who sustained head injuries, although two-fifths were required to wear them for certain tasks at specific locations.
- Only 1% of approximately 770 workers suffering face injuries were wearing face protection.
- Only 23% of the workers with foot injuries wore safety shoes or boots.
- About 40% of the workers with eye injuries wore eye protective equipment.

A majority of these workers were injured while performing their normal jobs at regular worksites.

OSHA standards require employers to furnish and require employees to use suitable protective equipment where there is a “reasonable probability” that injury can be prevented by such equipment. The standards also set provisions for specific equipment.

While use of PPE is important, it is only a supplementary form of protection, necessary where all hazards have not been controlled through other



A Worker with PPE on a Bosun's Chair

ADDED PPE PROTECTION FOR FALLS

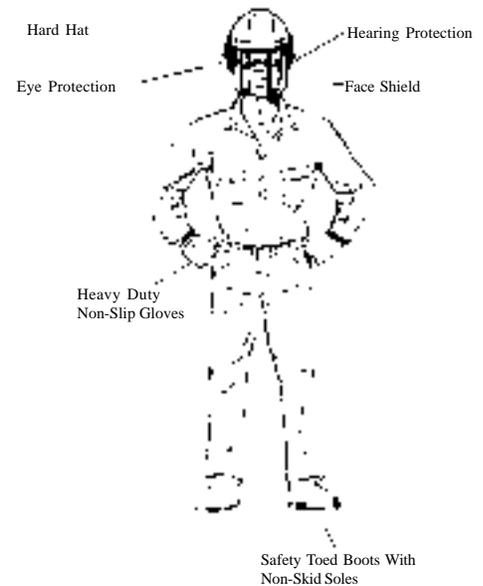
means such as engineering controls. Engineering controls are especially important in hearing and respiratory protection which have specific standards calling for employers to take all feasible steps to control the hazards.

ADDED PPE PROTECTION FOR FALLS

HEAD PROTECTION

Cuts or bruises to the scalp or forehead occurred in 85% of the head injury cases, concussions in 26%. Over a third of the cases resulted from falling objects striking the head.

Protective hats for head protection against impact blows must be able to withstand penetration and absorb the shock of a blow. In some cases hats should also protect against electric shock. Recognized standards for hats have been established by American National Standards Institute (ANSI).



FOOT PROTECTION

Sixty-six percent of injured workers were wearing safety shoes, protective footwear, heavy-duty shoes or boots, and 33% were wearing regular street shoes. Of those wearing safety shoes, 85% were injured because the object hit an unprotected part of the shoe or boot.

For protection against falling or rolling objects, sharp objects, molten metal, hot surfaces and wet, slippery surfaces, workers should use appropriate safety shoes or boots. Safety shoes should be sturdy and have an impact resistant toe. Shoes must meet ANSI standards.

EYE AND FACE PROTECTION

Injured workers surveyed indicated that eye and face protection normally was not used or practiced in their work areas, or it was not required for the type of work performed at the time of the accident.

Almost one-third of face injuries were caused by metal objects, most often blunt and weighing one pound or more. Accidents resulted in cuts, lacerations, or punctures in 48% of the total, and fractures (including broken or lost teeth) in 27%.

Protection should be based on kind and degree of hazard present and should:

- * be reasonably comfortable,
- * fit properly,
- * be durable,
- * be cleanable,
- * be sanitary,
- * be in good condition, and
- * be a minimum of safety glasses with side shields.

EAR PROTECTION

Exposure to high noise levels can cause irreversible hearing loss or impairment. It can also create physical and psychological stress.

Preformed or molded ear plugs should be individually fitted by a professional. Waxed cotton, foam or fiberglass wool earplugs are self-forming. Disposable earplugs should be used once and thrown away; nondisposable ones should be cleaned after each use for proper maintenance.

OSHA has promulgated a final rule on requirements for hearing conservation program. Information on the program is available from the OSHA office nearest you.

ARM AND HAND PROTECTION

Burns, cuts, electrical shock, amputation, cuts and absorption of chemicals are examples of hazards associated with arm and hand injuries. A wide assortment of gloves, hand pads, sleeves and wristlets for protection from these hazards is available.

The devices should be selected to fit the specific task. Rubber is considered the best materials for insulating gloves and sleeves and must conform to ANSI standards.

REMEMBER

REMEMBER

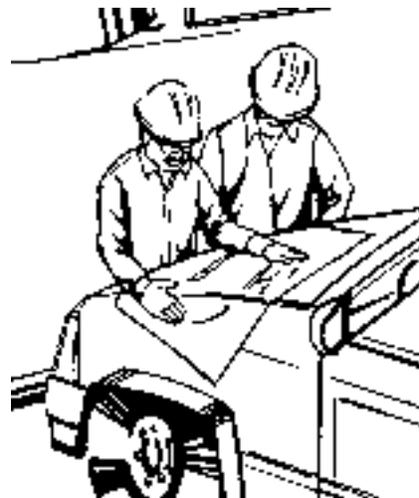
Using personal protective equipment requires hazard awareness and training on the part of the user. Employees must be aware that the personal protective equipment alone does not eliminate the hazard. If the PPE fails, exposure and injury can and will occur. However, you are at higher risk if you do not use it at all.

NOTES

7

FALL HAZARD ASSESSMENT ON THE JOB

Employers are required to assess the workplace to determine if fall protection is needed and the type of system that is feasible. Where a fall hazard exists, there are two options: A.-eliminate the hazard, or B.-provide protection against it. Ideally, it is best to eliminate the hazard. Since this is not always possible, however, other measures such as wearing of personal protective equipment (PPE) are required. Employees are not permitted to work on those surfaces until it has been determined that the surfaces have the requisite strength and structural integrity to support the workers. Once employers have determined that the surface is not safe due to fall hazards for employees to work on, the employer must select one of the fall protection systems for the work operation.



The fall protection standard covers all construction workers except those inspecting, investigating, or assessing workplace conditions prior to the actual start of work or after all work has been completed. The rule identifies areas or activities where fall protection is needed. These include, but are not limited to leading edges, ramps, runways, walkways; excavations; hoist areas; holes; form-related work; roofing; precast concrete erection; wall openings; residential construction; and other walking/working surfaces.

JOB HAZARD ANALYSIS

JOB HAZARD ANALYSIS

OSHA requires that all workers be trained in safe work practices. OSHA inspectors investigating serious accidents frequently ask employers if the injured workers have had training in performing their jobs safely. The Job Hazard Analysis is used to instruct workers in safe work procedures. It can prevent accidents that could result in occupational injury and illness.

Upon completion of this training all participants should be able to: - list the tasks or basic steps required to perform a particular operation. - identify hazards associated with each task. - identify the proper procedures or controls that should be in place to prevent illness or injury.

A Job Hazard Analysis identifies each job the worker is required to perform. It should include routine jobs that are performed on a daily basis and non-routine jobs that are performed infrequently.

Each job can be broken down into steps or tasks. The Job Hazard Analysis identifies the hazards associated with each step of the job. It then lists what controls should be in place and the specific procedures to follow to prevent an accident.

The best place to begin a Job Hazard Analysis is with jobs that have resulted in accidents or near-misses. By analyzing these jobs, safe procedures can be established and controls put in place to protect you and your co-workers.

Consider the jobs that you perform. Assist supervisors and management in conducting the Job Hazard Analysis. It will create a safer, healthier and more productive workplace which benefits workers, supervisors and management.

IDENTIFYING HAZARDS

IDENTIFYING HAZARDS

The Job Hazard Analysis requires the identification of hazards. Every hazard that exists for each task must be identified. Once hazards are identified they can be controlled.

Hazards are sometimes classified into six categories. By asking certain questions in each hazard category it is easier to identify existing hazards. It is important to remember that these questions may not identify all the hazards present. These basic questions are designed to help identify many of the hazards you may encounter.



Category #1 - FALLS Can you slip, trip or fall? Will the fall be to the same level or a lower level?

Category #2 - STRUCK BY Can you be struck by moving objects, flying objects or falling material?

Category #3 - STRIKE AGAINST Can you strike your body against stationary objects, moving objects, protruding objects, sharp or jagged objects?

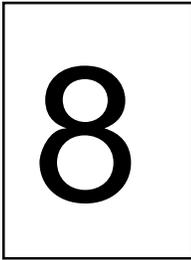
Category #4 - CAUGHT IN, ON, OR BETWEEN Can you be caught in, on, or between anything? Look for pinch points, protruding objects, moving and fixed objects.

Category #5 - CONTACT Will the task put you in contact with hazardous energy or hazardous materials such as electricity, chemicals, heat, cold, radiation, gases or fumes, water, steam, or poor air quality?

Category #6 - OVEREXERTION (LIFTING, PULLING, PUSHING)
Does the task involve lifting, pulling or pushing? Is there a possibility for overexertion or straining yourself? Is the job highly repetitive?

It is important to understand all of the hazards that are present and how they can result in an accident. Only after all the hazards are known and understood can measures be taken to control them and prevent occupational injury and illness.

NOTES



OSHA Fall Protection Standard

OSHA Regulations (Standards - 29 CFR)

Scope, application, and definitions applicable to this subpart. - 1926.500

STANDARD NUMBER 1926.500

- **Standard Number: 1926.500**
- **Standard Title: Scope, application, and definitions applicable to this subpart.**
- **SubPart Number: M**
- **SubPart Title: Fall Protection**
- **Applicable Standard: Applicable Standard:**

(a)

“Scope and application.”

(a)(1)

This subpart sets forth requirements and criteria for fall protection in construction workplaces covered under 29 CFR part 1926. Exception: The provisions of this subpart do not apply when employees are making an inspection, investigation, or assessment of workplace conditions prior to the actual start of construction work or after all construction work has been completed.

(a)(2)

Section 1926.501 sets forth those workplaces, conditions, operations, and circumstances for which fall Protection shall be provided except as follows:

(a)(2)(i)

Requirements relating to fall protection for employees working on scaffolds are provided in subpart L of this part.

(a)(2)(ii)

Requirements relating to fall protection for employees working on certain cranes and derricks are provided in subpart N of this part.

..1926.500(a)(2)(iii)

(a)(2)(iii)

Requirements relating to fall protection for employees performing steel erection work are provided in 1926.105 and in subpart R of this part.

(a)(2)(iv)

Requirements relating to fall protection for employees working on certain types of equipment used in tunneling operations are Provided in subpart S of this part.

(a)(2)(v)

Requirements relating to fall protection for employees engaged in the construction of electric transmission and distribution lines and equipment are provided in subpart V of this part.

(a)(2)(vi)

Requirements relating to fall protection for employees working on stairways and ladders are provided in subpart X of this part.

(a)(3)

Section 1926.502 sets forth the requirements for the installation, construction, and proper use of fall protection required by part 1926, except as follows:

(a)(3)(i)

Performance requirements for guardrail systems used on scaffolds and performance requirements for falling object protection used on scaffolds are provided in subpart L of this part.

(a)(3)(ii)

Performance requirements for stairways, stairrail systems, and handrails are provided in subpart X of this part.

..1926.500(a)(3)(iii)

(a) (3) (iii)

Additional performance requirements for personal climbing equipment, lineman's body belts, safety straps, and lanyards are provided in Subpart V of this part.

(a)(3)(iv)

Section 1926.502 does not apply to steel erection activities. (Note: Section 1926.104 sets the criteria for body belts, lanyards and lifelines used for fall protection in steel erection activities. Paragraphs (b), (c) and (f) of 1926.107 provide definitions for the pertinent terms).

(a)(4)

Section 1926.503 sets forth requirements for training in the installation and use of fall protection systems, except in relation to steel erection activities.

(b)

Definitions.

“Anchorace” means a secure point of attachment for lifelines, lanyards or deceleration devices.

“Body belt (safety belt)” means a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

“Body harness” means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

“Buckle” means any device for holding the body belt or body harness closed around the employee’s body.

“Connector” means a device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or dee-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

“Controlled access zone (CAZ)” means an area in which certain work (e.g., overhand bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.

“Dangerous equipment” means equipment (such as pickling or galvanizing tanks, degreasing units, machinery, electrical equipment, and other units) which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

“Deceleration device” means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

“Deceleration distance” means the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee’s body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

“Equivalent” means alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

“Failure” means load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

“Free fall” means the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

“Free fall distance” means the vertical displacement of the fall arrest attachment point on the employee’s body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

“Guardrail system” means a barrier erected to prevent employees from falling to lower levels.

“Hole” means a gap or void 2 inches (5.1 cm) or more in its least dimension, in a floor, roof, or other walking/working surface.

“Infeasible” means that it is impossible to perform the construction work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

“Lanyard” means a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

“Leading edge” means the edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an “unprotected side and edge” during periods when it is not actively and continuously under construction.

“Lifeline” means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

“Low-slope roof” means a roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

“Lower levels” means those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

“Mechanical equipment” means all motor or human propelled wheeled equipment used for roofing work, except wheelbarrows and mopcars.

“Opening” means a gap or void 30 inches (76 cm) or more high and 18 inches (48 cm) or more wide, in a wall or partition, through which employees can fall to a lower level.

“Overhand bricklaying and related work” means the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

“Personal fall arrest system” means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

“Positioning device system” means a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

“Rope grab” means a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

“Roof” means the exterior surface on the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily become the top surface of a building.

“Roofing work” means the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

“Safety-monitoring system” means a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

“Self-retracting lifeline/lanyard” means a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall

“Snaphook” means a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object.

Snaphooks are generally one of two types:

(b)(1)

The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection; or

(b)(2)

The non-locking type with a self-closing keeper which remains closed until pressed open for connection or disconnection. As of January 1, 1998, the use of a non-locking snaphook as part of personal fall arrest systems and positioning device systems is prohibited.

“Steep roof” means a roof having a slope greater than 4 in 12 (vertical to horizontal).

“Toeboard” means a low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

“Unprotected sides and edges” means any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches (1.0 m) high.

“Walking/working surface” means any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

“Warning line system” means a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without the use of guardrail, body belt, or safety net systems to protect employees in the area.

“Work area” means that portion of a walking/working surface where job duties are being performed.

**STANDARD
NUMBER
1926.501**

- **Standard Number: 1926.501**
- **Standard Title: Duty to have fall protection.**
- **SubPart Number: M**
- **SubPart Title: Fall Protection**
- **Applicable Standard: Applicable Standard:**

(a)

“General “

(a)(1)

This section sets forth requirements for employers to provide fall protection systems. All fall protection required by this section shall conform to the criteria set forth in 1926.502 of this subpart.

(a)(2)

The employer shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely. Employees shall be allowed to work on those surfaces only when the surfaces have the requisite strength and structural integrity.

(b)

(b)(1)

“Unprotected sides and edges.” Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.

(b)(2)

“Leading edges.”

(b)(2)(i)

Each employee who is constructing a leading edge 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with 1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

(b)(2)(ii)

Each employee on a walking/working surface 6 feet (1.8 m) or more above a lower level where leading edges are under construction, but who is not engaged in the leading edge work, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system. If a guardrail system is chosen to provide the fall protection, and a controlled access zone has already been established for leading edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge.

(b)(3)

“Hoist areas.” Each employee in a hoist area shall be protected from falling 6 feet (1.8 m) or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems, [or chain, gate, or guardrail] or portions thereof, are removed to facilitate the hoisting operation (e.g., during landing of materials), and an employee must lean through the access opening or out over the edge of the access opening (to receive or guide equipment and materials, for example), that employee shall be protected from fall hazards by a personal fall arrest system.

(b)(4)

“Holes.”,

(b)(4)(i)

Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than 6 feet (1.8 m) above lower levels, by personal fall arrest systems, covers, or guardrail systems erected around such holes.

(b)(4)(ii)

Each employee on a walking/working surface shall be protected from tripping in or stepping into or through holes (including skylights) by covers.

(b)(4)(iii)

Each employee on a walking/working surface shall be protected from objects falling through holes (including skylights) by covers.

(b)(5)

“Formwork and reinforcing steel.” Each employee on the face of formwork or reinforcing steel shall be protected from falling 6 feet (1.8 m) or more to lower levels by personal fall arrest systems, safety net systems, or positioning device systems.

(b)(6)

“Ramps, runways, and other walkways.” Each employee on ramps, runways, and other walkways shall be protected from falling 6 feet (1.8 m) or more to lower levels by guardrail systems.

(b)(7)
“Excavations.”

(b)(7)(i)
Each employee at the edge of an excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier;

(b)(7)(ii)
Each employee at the edge of a well, pit, shaft, and similar excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

(b)(8)
“Dangerous equipment.”

(b)(8)(i)
Each employee less than 6 feet (1.8 m) above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems or by equipment guards.

(b)(8)(ii)
Each employee 6 feet (1.8 m) or more above dangerous equipment shall be protected from fall hazards by guardrail systems, personal fall arrest systems, or safety net systems.

(b)(9)
“Overhand bricklaying and related work.”

(b)(9)(i)
Except as otherwise provided in paragraph (b) of this section, each employee performing overhand bricklaying and related work 6 feet (1.8 m) or more above lower levels, shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or shall work in a controlled access zone.

(b)(9)(ii)
Each employee reaching more than 10 inches (25 cm) below the level of the walking/working surface on which they are working, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

Note: Bricklaying operations performed on scaffolds are regulated by subpart L - Scaffolds of this part.

(b)(10)

“Roofing work on Low-slope roofs.” Except as otherwise provided in paragraph (b) of this section, each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system, or warning line system and safety monitoring system. Or, on roofs 50-feet (15.25 m) or less in width (see Appendix A to subpart M of this part), the use of a safety monitoring system alone [i.e. without the warning line system] is permitted.

(b)(11)

“Steep roofs.” Each employee on a steep roof with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety net systems, or personal fall arrest systems.

(b)(12)

“Precast concrete erection.” Each employee engaged in the erection of precast concrete members (including, but not limited to the erection of wall panels, columns, beams, and floor and roof “tees”) and related operations such as grouting of precast concrete members, who is 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems, unless another provision in paragraph (b) of this section provides for an alternative fall protection measure. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with 1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

(b)(13)

“Residential construction.” Each employee engaged in residential construction activities 6 feet (1.8 m) or more above lower levels shall be protected by guardrail systems, safety net system, or personal fall arrest system unless another provision in paragraph (b) of this section provides for an alternative fall protection measure. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with 1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

(b)(14)

“Wall openings.” Each employee working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is 6 feet (1.8 m) or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches (1.0 m) above the walking/working surface, shall be protected from falling by the use of a guardrail system, a safety net system, or a personal fall arrest system.

(b)(15)

“Walking/working surfaces not otherwise addressed.” Except as provided in 1926.500(a)(2) or in 1926.501 (b)(1) through (b)(14), each employee on a walking/working surface 6 feet (1.8 m) or more above lower levels shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

(c)

“Protection from falling objects.” When an employee is exposed to falling objects, the employer shall have each employee wear a hard hat and shall implement one of the following measures

(C)(1)

Erect toeboards, screens, or guardrail systems to prevent objects from falling from higher levels; or,

(c)(2)

Erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced; or,

(c)(3)

Barriade the area to which objects could fall, prohibit employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.

**STANDARD
NUMBER
1926.502**

- **Standard Number: 1926.502**
- **Standard Title: Fall protection systems criteria and practices.**
- **SubPart Number: M**
- **SubPart Title: Fall Protection**
- **Applicable Standard: Applicable Standard:**

(a)

“General.”

(a)(1)

Fall protection systems required by this part shall comply with the applicable provisions of this section

(a)(2)

Employers shall provide and install all fall protection systems required by this subpart for an employee, and shall comply with all other pertinent requirements of this subpart before that employee begins the work that necessitates the fall protection.

(b)

“Guardrail systems.” Guardrail systems and their use shall comply with the following provisions:

(b)(1)

Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches (1.1 m) plus or minus 3 inches (8 cm) above the walking/working level. When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria of this paragraph.

Note: When employees are using stilts, the top edge height of the top rail, or equivalent member, shall be increased an amount equal to the height of the stilts.

(b)(2)

Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches (53 cm) high.

(b)(2)(i)

Midrails, when used, shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.

(b)(2)(ii)

Screens and mesh, when used, shall extend from the top rail to the walking/working level and along the entire opening between top rail supports.

(b)(2)(iii)

Intermediate members (such as balusters), when used between posts, shall be not more than 19 inches (48 cm) apart.

(b)(2)(iv)

Other structural members (such as additional midrails and architectural panels) shall be installed such that there are no openings in the guardrail system that are more than 19 inches (.5 m) wide.

(b)(3)

Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 N) applied within 2 inches (5.1 cm) of the top edge, in any outward or downward direction, at any point along the top edge.

(b)(4)

When the 200 pound (890 N) test load specified in paragraph (b)(3) of this section is applied in a downward direction, the top edge of the guardrail shall not deflect to a height less than 39 inches (1.0 m) above the walking/working level. Guardrail system components selected and constructed in accordance with the Appendix B to subpart M of this part will be deemed to meet this requirement.

(b)(5)

Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding, without failure, a force of at least 150 pounds (666 N) applied in any downward or outward direction at any point along the midrail or other member.

(b)(6)

Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

(b)(7)

The ends of all top rails and midrails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.

(b)(8)

Steel banding and plastic banding shall not be used as top rails or midrails.

(b)(9)

Top rails and midrails shall be at least one-quarter inch (0.6 cm) nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it shall be flagged at not more than 6-foot intervals with high-visibility material.

(b)(10)

When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section shall be placed across the access opening between guardrail sections when hoisting operations are not taking place.

(b)(11)

When guardrail systems are used at holes, they shall be erected on all unprotected sides or edges of the hole.

(b)(12)

When guardrail systems are used around holes used for the passage of materials, the hole shall have not more than two sides provided with removable guardrail sections to allow the passage of materials. When the hole is not in use, it shall be closed over with a cover, or a guardrail system shall be provided along all unprotected sides or edges.

(b)(13)

When guardrail systems are used around holes which are used as points of access (such as ladderways), they shall be provided with a gate, or be so offset that a person cannot walk directly into the hole.

(b)(14)

Guardrail systems used on ramps and runways shall be erected along each unprotected side or edge.

(b)(15)

Manila, plastic or synthetic rope being used for top rails or midrails shall be inspected as frequently as necessary to ensure that it continues to meet the strength requirements of paragraph (b)(3) of this section.

(c)

‘Safety net systems.’ Safety net systems and their use shall comply with the following provisions:

(c)(1)

Safety nets shall be installed as close as practicable under the walking/working surface on which employees are working, but in no case more than 30 feet (9.1 m) below such level. When nets are used on bridges, the potential fall area from the walking/working surface to the net shall be unobstructed.

(c)(2)

Safety nets shall extend outward from the outermost projection of the work surface as follows:

(c)(3)

Safety nets shall be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified in paragraph (c)(4) of this section.

(c)(4)

Safety nets and their installations shall be capable of absorbing an impact force equal to that produced by the drop test specified in paragraph (c)(4)(i) of this section.

(c)(4)(i)

Except as provided in paragraph (c)(4)(ii) of this section, safety nets and safety net installations shall be drop-tested at the jobsite after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at 6-month intervals if left in one place. The drop-test shall consist of a 400 pound (180 kg) bag of sand 30 + or - 2 inches (76 + or - 5 cm) in diameter dropped into the net from the highest walking/working surface at which employees are exposed to fall hazards, but not from less than 42 inches (1.1 m) above that level.

(c)(4)(ii)

When the employer can demonstrate that it is unreasonable to perform the drop-test required by paragraph (c)(4)(i) of this section, the employer (or a designated competent person) shall certify that the net and net installation is in compliance with the provisions of paragraphs (c)(3) and (c)(4)(i) of this section by preparing a certification record prior to the net being used as a fall protection system. The certification record must include an identification of the net and net installation for which the certification record is being prepared; the date that it was determined that the identified net and net installation were in compliance with paragraph (c)(3) of this section and the signature of the person making the determination and certification. The most recent certification record for each net and net installation shall be available at the jobsite for inspection.

(c)(5)

Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. Defective components shall be removed from service. Safety nets shall also be inspected after any occurrence which could affect the integrity of the safety net system.

(c)(6)

Materials, scrap pieces, equipment, and tools which have fallen into the safety net shall be removed as soon as possible from the net and at least before the next work shift.

(c)(7)

The maximum size of each safety net mesh opening shall not exceed 36 square inches (230 cm) nor be longer than 6 inches (15 cm) on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not be longer than 6 inches (15 cm). All mesh crossings shall be secured to prevent enlargement of the mesh opening.

(c)(8)

Each safety net (or section of it) shall have a border rope for webbing with a minimum breaking strength of 5,000 pounds (22.2 kN).

(c)(9)

Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than 6 inches (15 cm) apart.

(d)

“Personal fall arrest systems.” Personal fall arrest systems and their use shall comply with the provisions set forth below. Effective January 1, 1998, body belts are not acceptable as part of a personal fall arrest system. Note: The use of a body belt in a positioning device system is acceptable and is regulated under paragraph (e) of this section.

(d)(1)

Connectors shall be drop forged pressed or formed steel, or made of equivalent materials.

(d)(2)

Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.

(d)(3)

Dee-rings and snaphooks shall have a minimum tensile strength of 5,000 pounds (22.2 kN).

(d)(4)

Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.

(d)(5)

Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member. Effective January 1, 1998, only locking type snaphooks shall be used.

(d)(6)

Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:

(d)(6)(i)

directly to webbing, rope or wire rope;

(d)(6)(ii)

to each other;

(d)(6)(iii)

to a dee-ring to which another snaphook or other connector is attached;

(d) (6) (iv)

to a horizontal lifeline; or

(d)(6)(v)

to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

(d)(7)

On suspended scaffolds or similar work platforms with horizontal lifelines which may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions on the lifeline.

(d)(8)

Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two

(d)(9)

Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2 kN).

(d)(10)

(d)(10)(i)

Except as provided in paragraph (d)(10)(ii) of this section, when vertical lifelines are used, each employee shall be attached to a separate lifeline.

(d)(10)(ii)

During the construction of elevator shafts, two employees may be attached to the same lifeline in the hoistway, provided both employees are working atop a false car that is equipped with guardrails; the strength of the lifeline is 10,000 pounds [5,000 pounds per employee attached] (44.4 kN); and all other criteria specified in this paragraph for lifelines have been met.

(d)(11)

Lifelines shall be protected against being cut or abraded.

(d)(12)

Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 feet (0.61 m) or less shall be capable of sustaining a minimum tensile load of 3,000 pounds (13.3 kN) applied to the device with the lifeline or lanyard in the fully extended position.

(d)(13)

Self-retracting lifelines and lanyards which do not limit free fall distance to 2 feet (0.61 m) or less, ripstitch lanyards, and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kN) applied to the device with the lifeline or lanyard in the fully extended position.

(d)(14)

Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made from synthetic fibers.

(d)(15)

Anchorage used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or shall be designed, installed, and used as follows:

(d)(15)(i)

as part of a complete personal fall arrest system which maintains a safety factor of at least two; and

(d)(15)(ii)

under the supervision of a qualified person.

(d)(16)

Personal fall arrest systems, when stopping a fall, shall:

(d)(16)(i)

limit maximum arresting force on an employee to 900 pounds (4 kN) when used with a body belt;

(d)(16)(ii)

limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness;

(d)(16)(iii)

be rigged such that an employee can neither free fall more than 6 feet (1.8 m), nor contact any lower level;

(d)(16)(iv)

bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet (1.07 m); and,

(d)(16)(v)

have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1.8 m), or the free fall distance permitted by the system, whichever is less.

Note: If the personal fall arrest system meets the criteria and protocols contained in Appendix C to subpart M, and if the system is being used by an employee having a combined person and tool weight of less than 310 pounds (140 kg), the system will be considered to be in compliance with the provisions of paragraph (d)(16) of this section. If the system is used by an employee having a combined tool and body weight of 310 pounds (140 kg) or more, then the employer must appropriately modify the criteria and protocols of the Appendix to provide proper protection for such heavier weights, or the system will not be deemed to be in compliance with the requirements of paragraph (d)(16) of this section.

(d)(17)

The attachment point of the body belt shall be located in the center of the wearer's back. The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.

(d)(18)

Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

(d)(19)

Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.

(d)(20)

The employer shall provide for prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves.

(d)(21)

Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.

(d)(22)

Body belts shall be at least one and five-eighths (1 5/8) inches (4.1 cm) wide.

(d)(23)

Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists except as specified in other subparts of this Part.

(d)(24)

When a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

(e)

“Positioning device systems.” Positioning device systems and their use shall conform to the following provisions:

(e)(1)

Positioning devices shall be rigged such that an employee cannot free fall more than 2 feet (.9m).

(e)(2)

Positioning devices shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee’s fall or 3,000 pounds (13.3 kN), whichever is greater.

(e)(3)

Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

(e)(4)

Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of this system.

(e)(5)

Connecting assemblies shall have a minimum tensile strength of 5,000 pounds (22.2 kN)

(e)(6)

Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.

(e)(7)

Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member. As of January 1, 1998, only locking type snaphooks shall be used.

(e)(8)

Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:

(e)(8)(i)

directly to webbing, rope or wire rope;

(e)(8)(ii)

to each other;

(e)(8)(iii)

to a dee-ring to which another snaphook or other connector is attached;

(e)(8)(iv)

to a horizontal lifeline; or

(e)(8)(v)

to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

(e)(9)

Positioning device systems shall be inspected prior to each use for wear, damage, and other deterioration, and defective components shall be removed from service.

(e)(10)

Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

(f)

“Warning line systems.” Warning line systems [See 1926.501(b)(10)] and their use shall comply with the following provisions:

(f)(1)

The warning line shall be erected around all sides of the roof work area.

(f)(1)(i)

When mechanical equipment is not being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge.

(f)(1)(ii)

When mechanical equipment is being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge which is parallel to the direction of mechanical equipment operation, and not less than 10 feet (3.1 m) from the roof edge which is perpendicular to the direction of mechanical equipment operation.

(f)(1)(iii)

Points of access, materials handling areas, storage areas, and hoisting areas shall be connected to the work area by an access path formed by two warning lines.

(f)(1)(iv)

When the path to a point of access is not in use, a rope, wire, chain, or other barricade, equivalent in strength and height to the warning line, shall be placed across the path at the point where the path intersects the warning line erected around the work area, or the path shall be offset such that a person cannot walk directly into the work area.

(f)(2)

Warning lines shall consist of ropes, wires, or chains, and supporting stanchions erected as follows:

(f)(2)(i)

The rope, wire, or chain shall be flagged at not more than 6-foot (1.8 m) intervals with high-visibility material;

(f)(2)(ii)

The rope, wire, or chain shall be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches (.9 m) from the walking/working surface and its highest point is no more than 39 inches (1.0 m) from the walking/working surface;

(f)(2)(iii)

After being erected, with the rope, wire, or chain attached, stanchions shall be capable of resisting, without tipping over, a force of at least 16 pounds (71 N) applied horizontally against the stanchion, 30 inches (.8 m) above the walking/working surface, perpendicular to the warning line, and in the direction of the floor, roof, or platform edge;

(f)(2)(iv)

The rope, wire, or chain shall have a minimum tensile strength of 500 pounds (2.22 kN), and after being attached to the stanchions, shall be capable of supporting, without breaking, the loads applied to the stanchions as prescribed in paragraph (f)(2)(iii) of this section; and

(f)(2)(v)

The line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.

(f)(3)

No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing roofing work in that area.

(f)(4)

Mechanical equipment on roofs shall be used or stored only in areas where employees are protected by a warning line system, guardrail system, or personal fall arrest system.

(g)

Controlled access zones.” Controlled access zones [See 1926.501(b)(9) and 1926.502(k)] and their use shall conform to the following provisions.

(g)(1)

When used to control access to areas where leading edge and other operations are taking place the controlled access zone shall be defined by a control line or by any other means that restricts access.

(g)(1)(i)

When control lines are used, they shall be erected not less than 6 feet (1.8 m) nor more than 25 feet (7.7 m) from the unprotected or leading edge, except when erecting precast concrete members,

(g)(1)(ii)

When erecting precast concrete members, the control line shall be erected not less than 6 feet (1.8 m) nor more than 60 feet (18 m) or half the length of the member being erected, whichever is less, from the leading edge.

(g)(1)(iii)

The control line shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.

(g)(1)(iv)

The control line shall be connected on each side to a guardrail system or wall.

(g)(2)

When used to control access to areas where overhand bricklaying and related work are taking place:

(g)(2)(i)

The controlled access zone shall be defined by a control line erected not less than 10 feet (3.1 m) nor more than 15 feet (4.5 m) from the working edge.

(g)(2)(ii)

The control line shall extend for a distance sufficient for the controlled access zone to enclose all employees performing overhand bricklaying and related work at the working edge and shall be approximately parallel to the working edge.

(g)(2)(iii)

Additional control lines shall be erected at each end to enclose the controlled access zone.

(g)(2)(iv)

Only employees engaged in overhand bricklaying or related work shall be permitted in the controlled access zone.

(g)(3)

Control lines shall consist of ropes, wires, tapes, or equivalent materials, and supporting stanchions as follows:

(g)(3)(i)

Each line shall be flagged or otherwise clearly marked at not more than 6-foot (1.8 m) intervals with high-visibility material.

(g)(3)(ii)

Each line shall be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches (1 m) from the walking/working surface and its highest point is not more than 45 inches (1.3 m) [50 inches (1.3 m) when overhand bricklaying operations are being performed from the walking/working surface.

(g)(3)(iii)

Each line shall have a minimum breaking strength of 200 pounds (.88 kN).

(g)(4)

On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, controlled access zones shall be enlarged, as necessary, to enclose all points of access, material handling areas, and storage areas.

(g)(5)

On floors and roofs where guardrail systems are in place, but need to be removed to allow overhand bricklaying work or leading edge work to take place, only that portion of the guardrail necessary to accomplish that day's work shall be removed.

(h)

"Safety monitoring systems." Safety monitoring systems [See 1926.501(b)(10) and 1926.502(k)] and their use shall comply with the following provisions:

(h)(1)

The employer shall designate a competent person to monitor the safety of other employees and the employer shall ensure that the safety monitor complies with the following requirements:

(h)(1)(i)

The safety monitor shall be competent to recognize fall hazards;

(h)(1)(ii)

The safety monitor shall warn the employee when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner;

(h)(1)(iii)

The safety monitor shall be on the same walking/working surface and within visual sighting distance of the employee being monitored;

(h)(1)(iv)

The safety monitor shall be close enough to communicate orally with the employee; and

(h)(1)(v)

The safety monitor shall not have other responsibilities which could take the monitor's attention from the monitoring function.

(h)(2)

Mechanical equipment shall not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs.

(h)(3)

No employee, other than an employee engaged in roofing work [on low-sloped roofs] or an employee covered by a fall protection plan, shall be allowed in an area where an employee is being protected by a safety monitoring system.

(h)(4)

Each employee working in a controlled access zone shall be directed to comply promptly with fall hazard warnings from safety monitors.

(i)

“Covers.” Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

(i)(1)

Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.

(i)(2)

All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.

(i)(3)

All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.

(i)(4)

All covers shall be color coded or they shall be marked with the word “HOLE” or “COVER” to provide warning of the hazard.

Note: This provision does not apply to cast iron manhole covers or steel grates used on streets or roadways.

(j)

“Protection from falling objects.” Falling object protection shall comply with the following provisions:

(j)(1)

Toeboards, when used as falling object protection, shall be erected along the edge of the overhead walking/working surface for a distance sufficient to protect employees below.

(j)(2)

Toeboards shall be capable of withstanding, without failure, a force of at least 50 pounds (222 N) applied in any downward or outward direction at any point along the toeboard.

(j)(3)

Toeboards shall be a minimum of 3 1/2 inches (9 cm) in vertical height from their top edge to the level of the walking/working surface. They shall have not more than 1/4 inch (0.6 cm) clearance above the walking/working surface. They shall be solid or have openings not over 1 inch (2.5 cm) in areatest dimension.

(j)(4)

Where tools, equipment, or materials are piled higher than the top edge of a toeboard, paneling or screening shall be erected from the walking/working surface or toeboard to the top of a guardrail system's top rail or midrail, for a distance sufficient to protect employees below.

(j)(5)

Guardrail systems, when used as falling object protection, shall have all openings small enough to prevent passage of potential falling objects.

(j)(6)

During the performance of overhand bricklaying and related work:

(j)(6)(i)

No materials or equipment except masonry and mortar shall be stored within 4 feet (1.2 m) of the working edge.

(j)(6)(ii)

Excess mortar, broken or scattered masonry units, and all other materials and debris shall be kept clear from the work area by removal at regular intervals.

(j)(7)

During the performance of roofing work:

(j)(7)(i)

Materials and equipment shall not be stored within 6 feet (1.8 m) of a roof edge unless guardrails are erected at the edge.

(j)(7)(ii)

Materials which are piled, grouped, or stacked near a roof edge shall be stable and self-supporting.

(j)(8)

Canopies, when used as falling object protection, shall be strong enough to prevent collapse and to prevent penetration by any objects which may fall onto the canopy.

(k)

“Fall protection plan.” This option is available only to employees engaged in leading edge work, precast concrete erection work, or residential construction work (See 1926.501(b)(2), (b)(12), and (b)(13)) who can demonstrate that it is infeasible or it creates a greater hazard to use conventional fall protection equipment. The fall protection plan must conform to the following provisions.

(k)(1)

The fall protection plan shall be prepared by a qualified person and developed specifically for the site where the leading edge work, precast concrete work, or residential construction work is being performed and the plan must be maintained up to date.

(k)(2)

Any changes to the fall protection plan shall be approved by a qualified person.

(k)(3)

A copy of the fall protection plan with all approved changes shall be maintained at the job site.

(k)(4)

The implementation of the fall protection plan shall be under the supervision of a competent person.

(k)(5)

The fall protection plan shall document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety nets systems) are infeasible or why their use would create a greater hazard.

(k)(6)

The fall protection plan shall include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection from the conventional fall protection systems. For example, the employer shall discuss the extent to which scaffolds, ladders, or vehicle mounted work platforms can be used to provide a safer working surface and thereby reduce the hazard of falling.

(k)(7)

The fall protection plan shall identify each location where conventional fall protection methods cannot be used. These locations shall then be classified as controlled access zones and the employer must comply with the criteria in paragraph (9) of this section.

(k)(8)

Where no other alternative measure has been implemented, the employer shall implement a safety monitoring system in conformance with 1926.502(h).

(k)(9)

The fall protection plan must include a statement which provides the name or other method of identification for each employee who is designated to work in controlled access zones. No other employees may enter controlled access zones.

(k)(10)

In the event an employee falls, or some other related, serious incident occurs, (e.g., a near miss) the employer shall investigate the circumstances of the fall or other incident to determine if the fall protection plan needs to be changed (e.g. new practices, procedures, or training) and shall implement those changes to prevent similar types of falls or incidents.

**STANDARD
NUMBER
1926.503**

- **Standard Number: 1926.503**
- **Standard Title: Training requirements.**
- **SubPart Number: M**
- **SubPart Title: Fall Protection**
- **Applicable Standard: Applicable Standard:**

The following training provisions supplement and clarify the requirements of 1926.21 regarding the hazards addressed in subpart M of this part.

(a)

“Training Program.”

(a)(1)

The employer shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.

(a)(2)

The employer shall assure that each employee has been trained, as necessary, by a competent person qualified in the following areas:

(a)(2)(i)

The nature of fall hazards in the work area;

(a)(2)(ii)

The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;

(a)(2) (iii)

The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used;

(a)(2)(iv)

The role of each employee in the safety monitoring system when this system is used;

(a)(2)(v)

The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs;

(a)(2)(vi)

The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection; and

(a) (2) (vii)

The role of employees in fall protection plans;

(a)(2)(viii)

The standards contained in this subpart.

(b)

“Certification of training.”

(b)(1)

The employer shall verify compliance with paragraph (a) of this section by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted by another employer or completed prior to the effective date of this section, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of actual training

(b)(2)

The latest training certification shall be maintained.

(c)

Training requirements. - 1926.503

“Retraining.” When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by paragraph (a) of this section, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

(c)(1)

Changes in the workplace render previous training obsolete; or

(c)(2)

Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or

(c)(3)

Inadequacies in an affected employee’s knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

Note: The following appendices to subpart M of this part serve as non-mandatory guidelines to assist employers in complying with the appropriate requirements of subpart M of this part.

9

FALL PROTECTION AND STEEL STRUCTURES

Steel Structures are some of the most hazardous situations in which falls frequently occur. The nature of the work itself has the characteristics of heights, slick surfaces, and in some cases illusional perception. The need for the use of 100% fall protection is ever evident in the number of falls, which accures on steel structures. From storage tanks to span bridges thousands of workers are continuously performing regularly scheduled maintainance work on these steel structures to insure their integrity. This does not include the new tanks and bridge structures being built today. We must understand that generally in some regions of the country this work is performed during warmer weather seasons.



Definition of 100% fall protection:
Never without fall protection/such as two lanyards with one being hooked at all times.

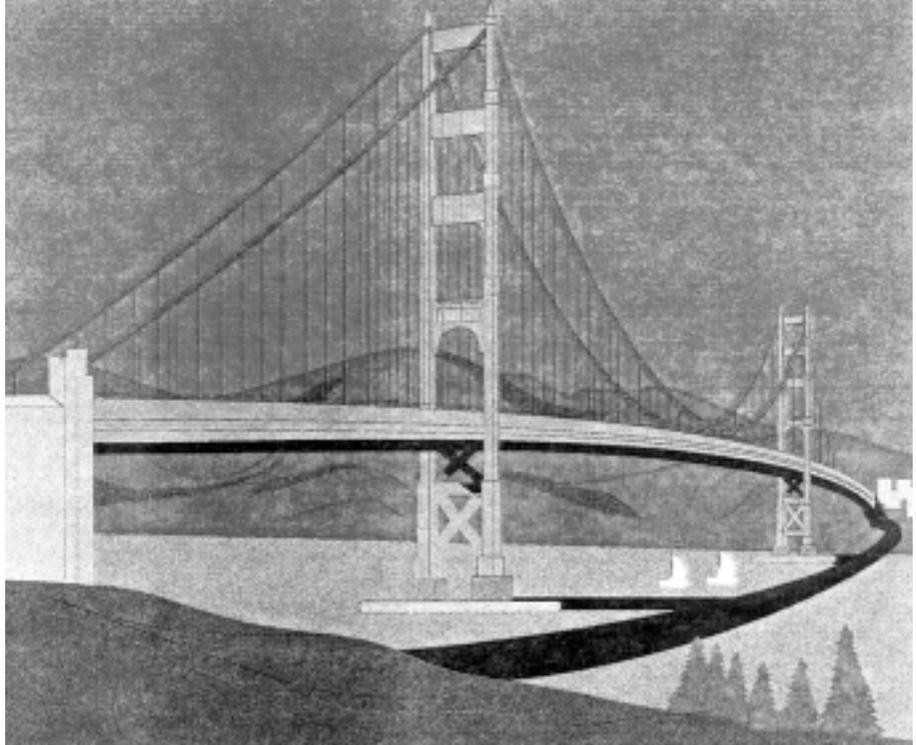
NOTE: Steel erection is covered in Subpart R.

This causes the work to be performed with longer working days than normal. Therefore a hidden hazard is a worker becoming tired and failing to follow all safety rules such as 100% fall protection. Then later in the work season as the weather become damper do to moisture in the air, slips are more likely to accure. If 100% fall protection is not being utilized constantly then injuries or deaths will surely accure.

On Storage tanks, bridges and other vessels constructed of steel various types of rigging, work platforms, swing stages, scaffolding and containments are used to accomplish the work are performed. Due to the nature of working on or in some of these type job settings workers must be knowledgeable of the hazards, which exists, and how to use 100% fall Protection. We must also realize that in the many types of the containments used on these structures worker vision is often obstructed by poor lighting, as well as dust, which is ever present when abrasive blasting is being performed. The positive and negative air systems are vital for more than removing hazardous breathable dust. These systems also enable workers to safely see other hazards, such as the end of a working surface or objects, which would cause a worker to stumble and fall.

Workers performing blasting operations with the abrasives such as steel shot, black beauty, sand, ect. must be ever vigilant of their lifelines and lanyards, which during blasting operation must maintain their integrity. Constant inspection of the fall protection system is vital during all blasting operations to insure safety. This is due to how quickly the abrasives from a blast nozzle can cut and damage your safety equipment.

On steel structures chemicals are commonly present. They are used for cleaning and in some cases used for striping or removing coating. These chemicals can silently damage your fall protection equipment. The daily inspection of your full body harness and lanyard, as well as the cleaning of this equipment will help prevent a serious accident from occurring. Remember these chemicals are very toxic and they cannot only damage your fall protection equipment but can cause neurological damage and respiratory damage to you. Therefore you need to know what chemicals you are working with or around to protect both your health and safety equipment.



10

LADDER SAFETY IN FALL PROTECTION

Ladders are a major source of injuries and fatalities, even though the ladder is a simple tool. Just two rails, rungs and some hardware is all that holds it together. A license or certification is not required to operate it. Unfortunately, according to OSHA reports, there are over 50 deaths and over 24,000 disabling injuries each year to people on ladders and stairs due to falls. Other accident causes can include contact with electricity, over loading, improper setup and positioning. These incidents are due to improper use and lack of respect for the potential hazards. Ladder accidents can be prevented by respecting potential hazards and taking the right steps to allow you to work safely from a ladder. Ladder safe work practices should include:

- Selecting the Proper Ladder for the Job
- Inspecting for Defects
- Setting Up for Optimum Stability
- Safely Working From the Ladder
- Climbing Fixed Ladders
- Proper Maintenance and Storage

LADDER SELECTION

LADDER SELECTION

Using the correct ladder for the job requires an understanding of both the work site and the ladders available to you. When selecting a ladder, you need to know the physical demands of the job and potential hazards at the job site.

Physical Demands

- How much weight will be applied ?
- What length of ladder is needed?
- How will it be able to be positioned?

Potential Hazards

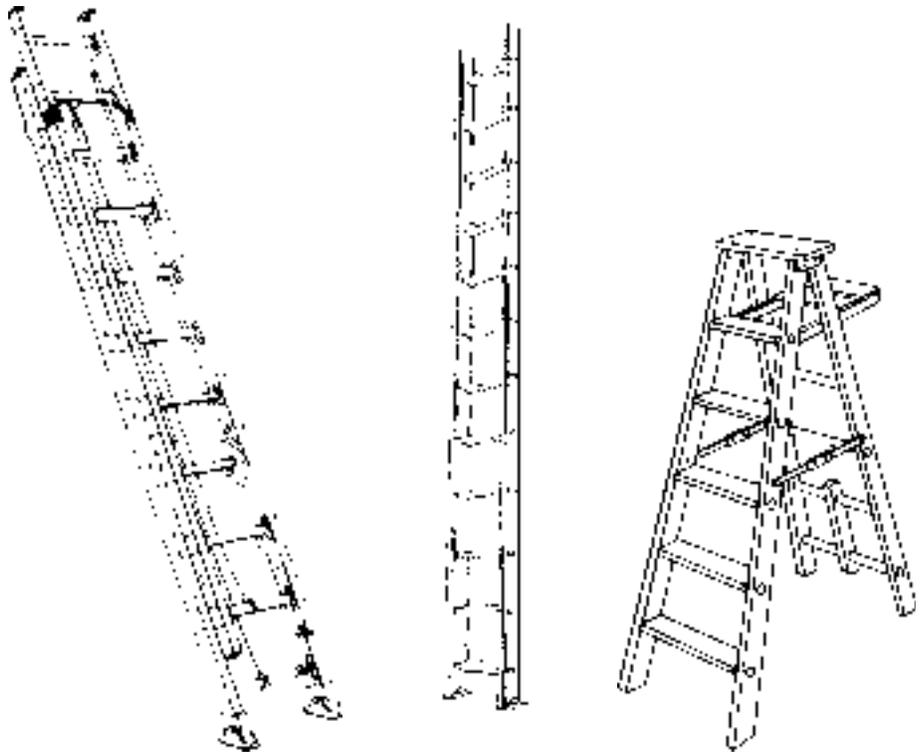
- * Overhead Obstructions
- * Electrical Hazards
- * Congested Area
- * Uneven Surface

LADDER CLASSIFICATION

LADDER CLASSIFICATION

There are a wide variety of ladders designed for different jobs. The three most common materials for portable ladders are fiberglass, wood and aluminum. These can be straight, extension, trestle or self-supporting stepladders. Which of the following ladders do you use at your facility?

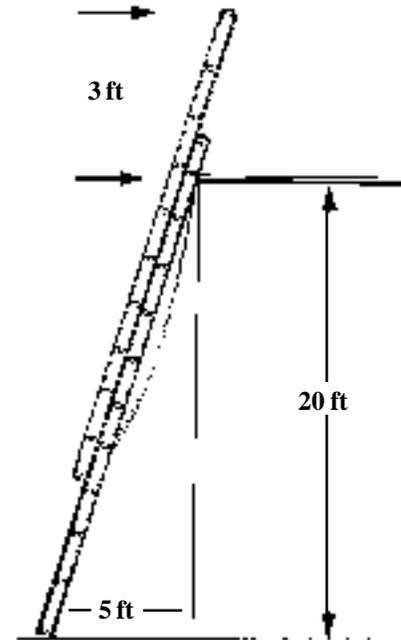
- * Aluminum Step Ladder
- * Aluminum Extension Ladder
- * Fiberglass Step Ladder
- * Fiberglass Extension
- * Wood Step Ladder
- * Wood Straight Ladder
- * Wood Extension
- * Job Made Ladder
- * Others



THE 4-TO-1 RATIO

The 4-to-1 Ratio applies to the distance the ladder's base must be from the foundation. This is figured by dividing the length of the structure from the ground to the top support point (where the ladder rests against the building) by four. It does not include the 3-foot extension beyond the roof line. If the top support is at 20 feet, the ladder's base should be 5 feet from the foundation.

The 4-to-1 Ratio is important because the angle it creates utilizes the ladder's strength and gives you optimum balance when climbing.



3-FOOT RULE

Extending the ladder three feet beyond the roof prevents you from tipping the ladder by stepping on one of the top steps.

Never step over the top of the ladder. Step sideways onto the roof.

SELF-SUPPORTING LADDERS

Self-supporting ladders or stepladders should be set up so that all four legs are on solid ground and the spreaders are locked. Do not use a self-supporting ladder as a straight ladder by leaning it against a structure. (Do not use on Scaffolds)

FOOTING SUPPORT

Place the ladder on a firm, even surface whenever possible. If the ladder must be placed on uneven ground, use a ladder leveler. These attach to the ladder rails and can be adjusted to balance the ladder. Never use boards or boxes to level out the ladder or to achieve additional height.

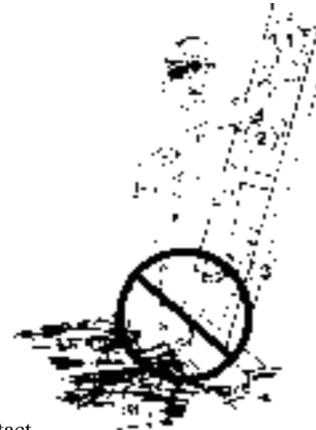
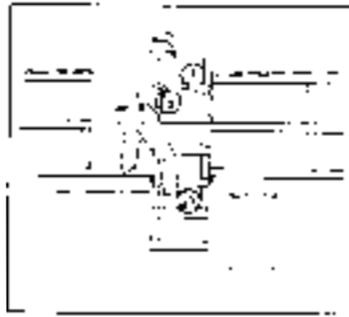
The feet of an extension ladder should be flat on a hard surface and in the spiked position on soft ground or grass. Rubber feet can be attached to a wood ladder to prevent slipping on a concrete surface.

SECURING THE LADDER

An extension ladder should be tied off at the top, middle and bottom to prevent ladder movement or slipping. The structure that you tie the ladder to must be capable of supporting the ladder. A second person should act as a spotter and hold the ladder at the bottom. Tie off at the bottom of the overlap section to prevent slippage. The top must extend three feet beyond the roof line if you are climbing onto the structure.

CLIMBING THE LADDER

- Clean your shoes.
- Do not attempt to carry heavy or bulky objects with you. Use a towline or a tool belt. Do not use any part of a PFAS.
- Keep three points of contact: two hands and a foot or two feet and a hand.
- Face the ladder and keep your belt buckle between the rails.
- Do not hurry up a ladder.



Place both hands firmly on rungs before stepping onto a ladder. Use 3-point contact when climbing up or down a ladder. That means two hands and one foot or two feet and one hand on the ladder at all times. Clean mud and snow off your boots before climbing a ladder

FIXED LADDERS

Always face the ladder and maintain three points of contact. Concentrate only on climbing the ladder. Tools should be carried in a tool belt or pouch.

Climbing a fixed ladder can be strenuous because of the steep angle. Rest on a landing or against the wall if you are tired.

Report any defects you find on a fixed ladder immediately.

SUMMARY

An accident at ground level can result in an injury or fatality no matter what was the cause. But falls from height are often more life threatening. Remember when you work on a ladder of all potential hazards and protect yourself and your fellow workers.

11

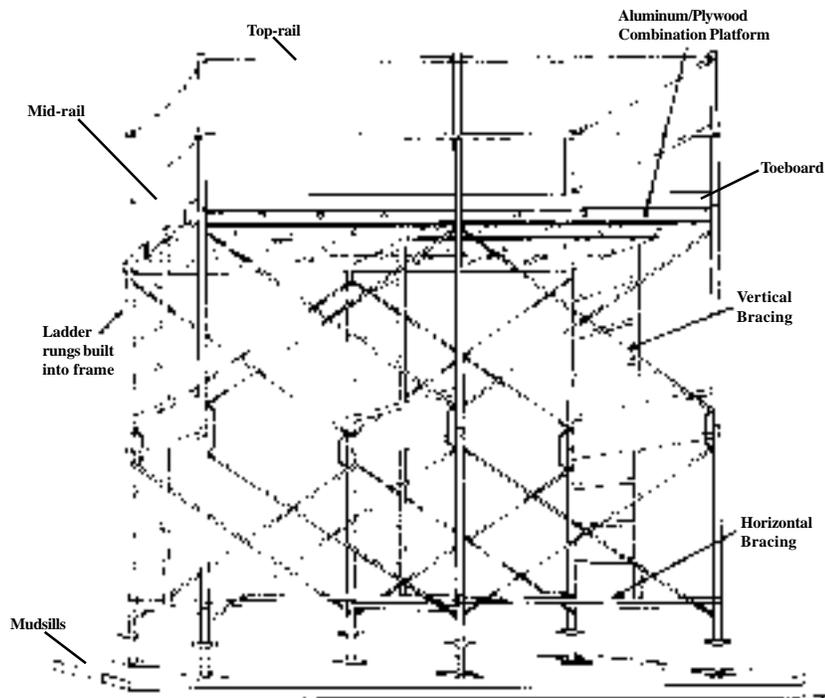
SCAFFOLDING SAFETY AND FALL PROTECTION

Fall fatalities from scaffolds account for over 20% of all fall deaths. Most are caused because of lack of fall protection, no guardrails, suspension rope failure, and collapse/ failure to name a few. When is fall protection required? Fall protection is required when working on scaffolds that are more than 10 feet above a lower level. It is also required during erecting and dismantling, unless the competent person shows that it would create a greater hazard or is not feasible. The type of fall protection required varies depending on the type of scaffold.

SUPPORTED SCAFFOLD

SUPPORTED SCAFFOLD

Scaffolds are temporary elevated work platforms. Supported scaffolds have one or more platforms that are supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support. They include but are not limit to- fabricated frame scaffold, tube and coupler, pump jack, prefabricated mobile tower units, ladder jacks, manually propelled mobile scaffold, etc..

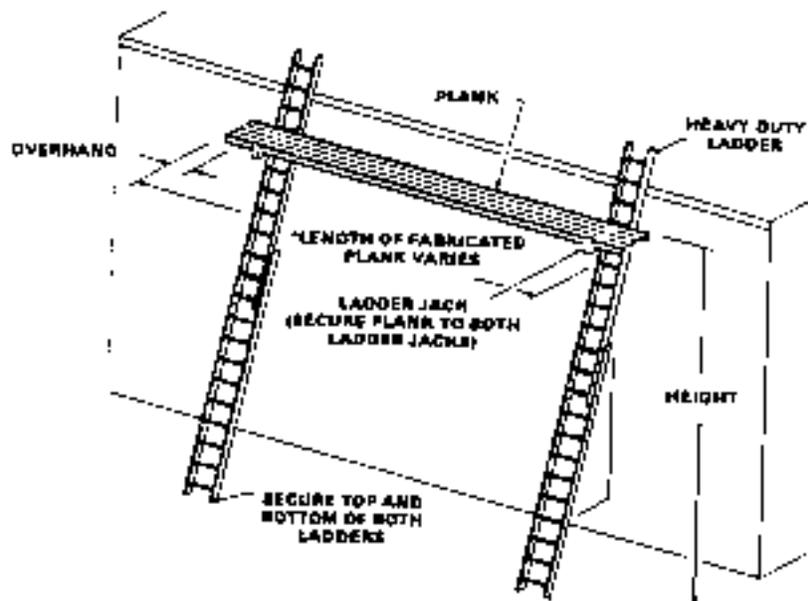


Guardrail Systems

- Guardrails must be installed along all open sides and ends of scaffolds that are more than 10 feet above a lower level.
- The top edge height of top rails on supported scaffolds must be installed between 38 and 45 inches above the platform.
- When midrails, screens, mesh, intermediate vertical members, solid panels, or similar structural members are used, they must be installed between the top edge of the guardrail system and the scaffold platform.

Personal Fall Arrest Systems

- When engineering controls such as guardrails and safety nets cannot protect you from fall hazards then a personal fall arrest system must be used. In the construction industry, a personal fall arrest system is required at heights of 10 feet or more when utilizing scaffolds. A personal fall arrest system, must be attached by lanyard to a vertical lifeline, horizontal lifeline, or scaffold structural member if designed for such use.
- The personal fall arrest system must limit free fall to six feet or less.
- Do not attach the personal fall arrest system to the guardrail system.



Personal Fall Arrest System Required When Using Ladder Jacks

NOTE: Scaffolds should be used as anchor points under certain circumstance and as a last resort.

- The anchor point must be able to support 5,000 pounds per attached worker. When vertical lifelines are used, the anchor point must be independent of the scaffold. Standpipes, vents, other piping systems, electrical conduits, outrigger beams, and counterweights are NOT considered safe points of anchorage.
- Inspect the personal fall arrest system before each use. Look for wear, tears, cuts, and other signs of damage.

A competent person will determine if fall protection is feasible during erecting and dismantling procedures. Check with your supervisor or the competent person if you are not sure what type of fall protection is required.

FALLING OBJECT PROTECTION

FALLING OBJECT PROTECTION

- A hard hat must be worn whenever there is a possibility of being struck by falling objects, impact while handling material at head level, or other situations where the danger of injuries to the head exists. OSHA (Occupational Safety and Health Administration) recommends that if a hard hat is needed anywhere on the job site, then you should wear it at all times.
- If tools, materials, or equipment could fall and strike employees below, then the area must be barricaded and personnel must not be allowed to enter. If tools or other objects can fall from the scaffold then toe boards must be used.
- Toeboards must be at least 3 1/2 inches high from the top edge of the toeboard to the level of the walking surface, have no more than a 1/4 inch clearance above the walking/working surface, and be solid or have openings no larger than one inch in size.
- If tools, materials, or equipment are piled higher than the top edge of the toeboard, then mesh, debris nets, canopies or other means of protection must be installed.

The following are some general protection requirements for supported scaffolds:

- All supported scaffold poles, legs, posts, frames, and uprights must bear on base plates, mud sills, or other firm foundation.

-
- They must also be plumb and braced to prevent swaying and displacement.
 - Footings must be level, sound, rigid, and capable of supporting the load of the scaffold without settling or displacement.
 - Never use cinder blocks, bricks, gravel, loose fill, or other means for leveling uneven surfaces or providing a foundation for the base plate.
 - When supported scaffolds have a height to base width ratio of more than 4-to-1 (four feet of height for every one foot of width) then guys, ties, or braces must be installed at locations where horizontal members support both inner and outer legs. These devices must be installed at each end of the scaffold and at horizontal intervals not to exceed 30 feet from one end.
 - For scaffolds three feet wide or less, guys, ties or braces, must be used at the closest horizontal member every 20 feet of vertical height. For scaffolds wider than three feet, the requirement is every 26 feet or less.
 - Many scaffold related injuries occur while improperly getting on or off platforms. Never jump onto a scaffold.
 - When the scaffold platform is more than two feet above or below a point of access, then a portable ladder, hook-on ladder, stairway, ramp, or other means of access that does not affect the scaffold's stability must be used.
 - Never use crossbraces to climb onto the scaffold or another level of the scaffold.
 - Direct access from one scaffold to another can only be used when the scaffold surfaces are not more than 14 inches horizontally and 24 inches vertically from each other.

Stairtowers (Scaffold Stairway/Towers)

- Stairtowers must be positioned so their bottom step is not more than 24 inches above the scaffold supporting level.
- Stairways must be installed between 40 degrees and 60 degrees from the horizontal. Each stairway must be at least 18 inches between stair rails.
- Each side of the scaffold stairway must have a stairrail that includes a toprail and a midrail. Stairrails must be between 28 inches and 37 inches in height, from the top of the stairrail to the surface of the tread.
- The toprail of each stairrail system must also serve as a handrail, unless a separate handrail is provided. All handrails must provide a good handhold for employees.
- A landing platform at least 18 inches wide and at least 18 inches long must be provided at each level. All treads and landings must have slip-resistant surfaces. Guardrails must be provided on the open sides and ends of each landing.

Ramps and Walkways

- All ramps and walkways that are six feet or more above lower levels must have guardrails.
- A ramp or walkway that is steeper than one vertical to eight horizontal, must have cleats not more than 14 inches apart that are securely fastened to the planks to provide footing. Ramps and walkways may not incline more than a slope of one vertical to three horizontal.

Access for Supported Scaffolds

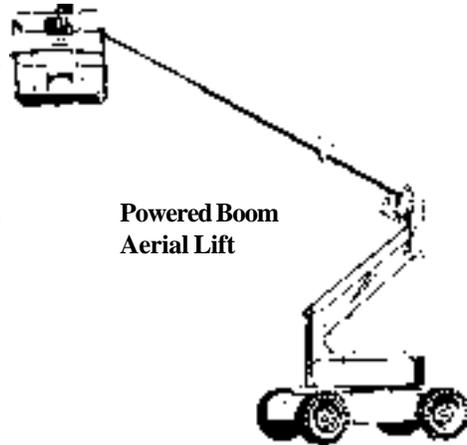
- When erecting or dismantling a scaffold, a safe means of access must be provided, if possible. A competent person will determine this based on site conditions and the type of scaffold being erected or dismantled.
- Hook-on or attachable ladders must be installed as soon safe installation and use are possible.
- When erecting or dismantling tubular welded frame scaffolds, end frames with horizontal members that are parallel, level, and not more than 22 inches apart vertically may be used as climbing devices for access.

12

AERIAL LIFT SAFETY AND FALL PROTECTION

NOTE: 29 CFR 1926.453 only covers vehicle mounted elevating and rotary platforms. It does not cover scissor lifts. Always check the manufacturers instructions when using any aerial lifts

Aerial lifts are used to lift personnel to the work area and to provide a safe working platform. The construction worker can be positioned at work areas that are otherwise inaccessible. This equipment enables the worker to work above floor level up to the lifts reach capacity and virtually anywhere in-between. This equipment is widely used on construction sites due to its versatility and ease of operation.



When operating aerial lift platforms you must think of safety for yourself as well as fellow workers in the area. As with any equipment that we work at heights on we must be on the constant lookout for fall hazard. You must maintain a constant awareness of work-site conditions and potential hazards in your work environment.

OSHA’s Scaffold standard 29CFR1926.453 (Construction) and operating manuals of the equipment, all provide rules and guidelines for the safe operation of the equipment in use. Reference these manuals for additional information.

Remember, you are the key to safety! Good safety work practices not only protect you, but also the people around you. Make safety a priority during your normal work day and remember safety can prevent a serious injury or death.

HAZARDS ASSOCIATED WITH AERIAL-LIFT PLATFORMS

HAZARDS ASSOCIATED WITH AERIAL-LIFT PLATFORMS

Falls

Aerial-lift platforms allow workers to perform their work at elevated sites. Falls from the equipment constitute a major hazard.

Electrocution

Positioning of the work platform too close to energized power lines or energized equipment increases the chances of electrocution and must be considered a major hazard of aerial platform operation. Always maintain a distance of least 10 feet.

Physical Injury

The equipment could possibly tip over due to unstable ground conditions, poor operating practice, or overloading.

The construction worker could be crushed or physically injured due to careless handling or inexperience using the controls .

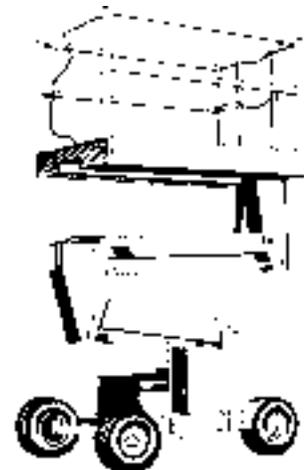
BASIC RESPONSIBILITIES

Employers must provide good job management, safety control, and the application of sound principles of safety, training, inspection, maintenance, and operation. Provide manufacturers manuals of operation and maintenance. Provide training for maintenance and operation and maintain records of training. Employees should inspect, maintain, and operate the equipment properly. Read and understand the manufacturer's operating instructions and user safety rules. Receive training by a qualified person in the purpose and function of each of the controls. Understand all of the warning labels, decals, and instructions displayed on the equipment. Inspect workplace for hazards. Operate the equipment within the rated capacities. Decisions on the use of the aerial platform or manlift must be based on how the work can be performed safely by the operator.

Use good judgement, safe work practices, and caution when operating the aerial-lift platform or manlift as your safety and the safety of those working with you depends on it.

TYPES OF AERIAL PLATFORMS

- Manual Vertical Aerial Platforms
- Powered Vertical Aerial Platforms
- Boom Supported Aerial Platform



**Powered Aerial
Lift Platform**

Safe Work Practices

Read and understand the manufacturers operating manual prior to operation. Know the limitations of the unit, such as load capacity, vertical limit, horizontal limit, etc.

Survey the terrain and area where the lift will be used prior to operation to assure ground stability and overhead hazards; such as, electrical wires are not present.

Test the operating controls and check the units critical components to insure they are working properly and develop familiarity prior to use.

Always work from the floor of the platform or basket, and wear full body harness with lanyard when required.

Aerial Lift Rules

- Only trained and authorized operators shall be permitted to operate the aerial lift.
- A malfunctioning lift shall be shut down until repaired.
- Controls shall be plainly marked as to their function.
- The controls shall be tested each day prior to use to determine that they are in safe operating condition.
- All personnel in the platform shall wear approved fall protection system (see manufacturers operating procedures) that is attached to the platform attachment point. The state of the art fall protection would be a class III full body harness and lanyard.
- Load limits specified by the manufacturer shall not be exceeded.
- Instructions and warning placards must be legible.
- Aerial lifts shall not be "Field Modified" unless certified in writing by the manufacturer to be at -least as safe as prior to modification.
- Aerial lifts shall not be used near electric power lines unless the lines have been de-energized or adequate clearance is assured.



Scissors Lift

NOTE: Workers on scissor lifts equipped with guardrails do not have to wear a PFAS. See manufacturer's instruction.

- Employees using aerial lifts shall be instructed how to recognize and avoid unsafe conditions and hazards.
- Ground controls shall not be operated unless permission has been obtained from personnel in the basket except in case of emergency.
- Regular inspections of the aerial lift and Job-site shall be performed by competent persons.
- Personnel shall always stand on the floor of the platform, not on boxes, planks, railings, or other devices for a work position.

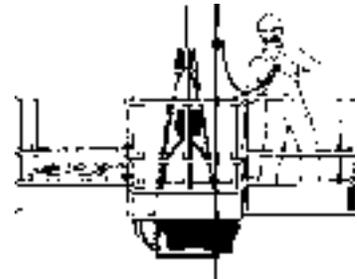
The Do's and Don'ts of Aerial Platforms

- **DO** wear fall protection (see manufacturers operating instructions) when on or operating the aerial-lift- it may even be smarter to wear a full body harness and lanyard.
- **DO NOT** operate near electrical conductors. Consider all conductors energized.
- **DO** wear appropriate personal protective equipment hard hats, etc.
- **DO** read manufacturers recommendations for operation and maintenance and assure operator qualifications.
- **DO NOT** operate the platform unless guardrails and chains are in place. Operate only on stable level ground.
- **DO** keep ground personnel from under elevated equipment.
- **DO NOT** exceed rated platform capacities.
- **DO NOT** allow wires, cables, ropes, or other equipment to trail down the platform when moving lifts.
- **DO NOT** operate unless you are completely familiar with all operating characteristics and have inspected and tested all functions to assure proper working order.
- **DO NOT** operate unless all warning and caution decals are in place.
- **DO NOT** use ladders, planks, or other devices to extend or increase the work position of the platform.
- **DO NOT** sit, stand, or climb on platform railings.
- **DO NOT** use the lift for any other purpose except to position personnel, their tools, and equipment.
- **DO NOT** use as a crane.
- **DO NOT** operate lifts outside in high wind conditions or modify without manufacturers approval.
- **DO NOT** override any safety features of the lift.
- **DO** assure all outriggers are properly set prior to elevating if so equipped.
- **DO NOT** carry loads outside the platform.
- **DO** remain inside the platform while working aloft.

13

SUSPENDED SCAFFOLDING SAFETY AND FALL PROTECTION

On average over 30 % of all scaffold fatalities are related to suspended scaffolds. Falls are of big concern. This includes 1 and 2 point suspended scaffolds, bosun's chair, and suspended platforms. Suspension scaffolds have one or more platforms suspended by ropes or other non-rigid means from an overhead structure. Before the suspension scaffold is used, a competent person must confirm that the supporting surfaces are capable of supporting the loads imposed on them. The following are some general requirements for suspension scaffolds:



**One Point
Suspended Gage Platform**

Types of Suspended Scaffold

- * Boatswains' chair, catenary scaffold, float scaffold, needle beam scaffold, etc.;
- * Single-point or two-point adjustable suspension scaffolds;

Ropes

- * Ropes must be capable of supporting 6 times the maximum intended load.
- * NEVER use repaired wire rope as suspension rope.
- * Ropes need to be inspected by a competent person for defects before each work shift and after any occurrence that could affect a rope's integrity.
- * Replace ropes with any signs of defects or damage.

Hoists

- * Gasoline-powered equipment and hoists must not be used on suspension scaffolds.

- Gears and brakes of power-operated hoists used on suspension scaffolds must be enclosed.

Support Devices

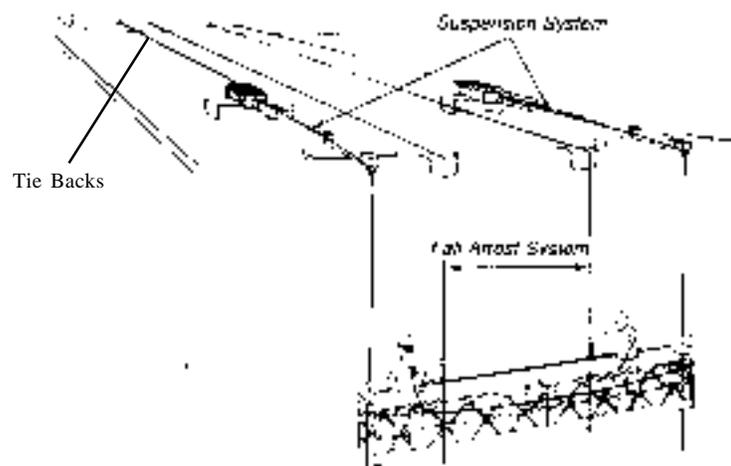
- All suspension scaffold support devices (such as outrigger beams, cornice hooks, and parapet clamps) must rest on surfaces that are capable of supporting four times the load imposed on them.
- Two-point and multi-point suspension scaffolds must be tied or otherwise secured to prevent them from swaying if a competent person determines it is necessary. NEVER use window cleaners' anchors for this purpose.

Outrigger Beams

- When suspension scaffold outrigger beams are used, they must be restrained to prevent movement. The inboard ends of suspension scaffold outrigger beams must be stabilized by bolts or other direct connections to the floor or roof deck, or by counterweights.

Counterweights

- Never use sand, gravel, or other materials that can be easily dislocated as counterweights. Only objects specifically designed as counterweights must be used.
- Counterweights must be secured by mechanical means to the outrigger beams to prevent accidental displacement.
- Do not remove the counterweights until the scaffold is disassembled.



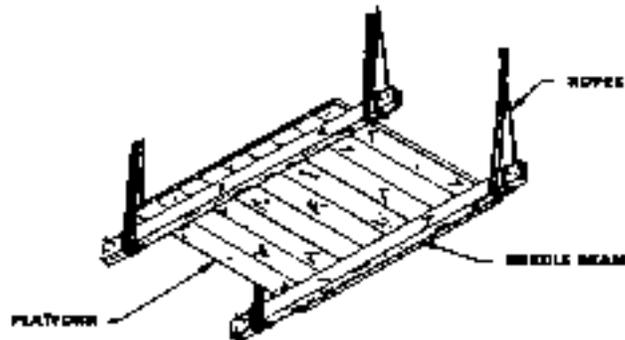
Two Point Suspended Scaffold (Swingstage)

Tie-backs

- Outrigger beams that are not stabilized by bolts or other direct connections to the floor or roof deck must be secured by tiebacks.
- Tiebacks must be equal in strength to the suspension ropes.
- Tiebacks must be secured to a structurally sound anchor points on the building or structure. Do NOT use standpipes, vents, or electrical conduits as anchor points.
- Tiebacks must be installed perpendicular to the face of the building or structure, or opposing angle tiebacks must be installed

Falls

- Engineering controls and safe work practices should always be used first to eliminate potential fall hazards. But when controls such as guardrails and screens cannot eliminate the hazards, then a personal fall arrest system must be worn. On suspended scaffolds a personal fall arrest system must be in place and properly used. It should also be pointed out that even with a proper personal fall protection system workers are still killed because of improper use, such as improper tie-offs or not tying off at all.



Needle Beam Scaffold Requires Personal Fall Arrest System

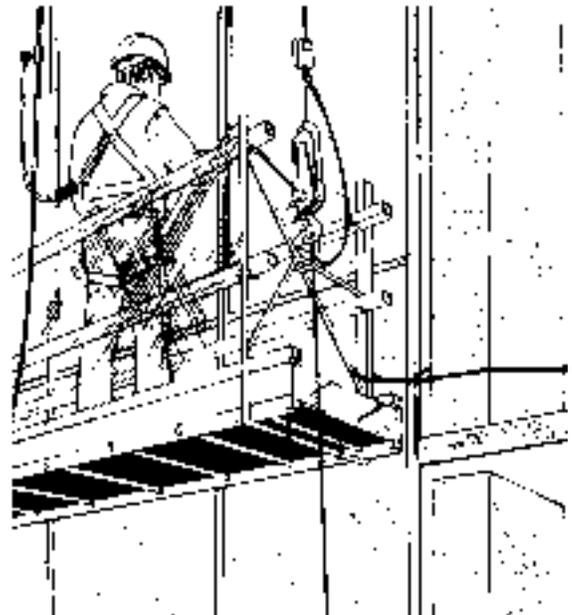
Personal Fall Arrest Systems

- A basic personal fall arrest system includes a full body harness, a lanyard with a locking snap-hook, and an anchor point. Other parts could include a shock absorbing lanyard, a lifeline, or a deceleration device.

- Personal fall arrest systems must be used at a height of 10 feet or more when any of the following situations exists: the scaffolding platform is less than 18 inches wide, guardrails are less than 36 inches tall, or a single- or twopoint suspension scaffold is used.
- A personal fall arrest system must limit free fall to six feet or less. Free fall is the act of falling before the personal fall arrest system begins to apply force to stop the fall.
- The anchor point must be able to support 5,000 pounds for each worker that is attached to it.
- Standpipes, vents, drainpipes, and electrical conduits on buildings can not be used as proper anchor points.
- If structural members of the scaffolds are used as anchor points, then the scaffold must be tied or have independent support lines.
- Inspect the body harness and lanyard before each use. Look for wear, tears, deterioration, and other signs of damage.
- The type of fall protection system required depends on the scaffold you are using.

Safe Work Practices

Scaffolds are a tremendous benefit for workers and employers alike. Scaffolds provide a stable platform for working above ground levels and at heights. While injuries and death might result from a number of things we must always remember the potential hazards and protect ourselves and fellow workers.



**Suspended Scaffold With Guardrails
and Personal Fall Arrest System**

NOTE: Ladders can be used on full area scaffolds only.

- ✱ Always use proper fall protection.
- ✱ Never use a ladder, boxes, barrels or other objects to elevate your height while on a scaffold.
- ✱ Never extend your body over the edge of the platform or guardrail.
- ✱ Keep both feet on the platform surface.
- ✱ Always keep three points of contact when climbing a ladder.
- ✱ Keep all walkways and working surfaces clear of tools and debris.
- ✱ If a scaffold is covered with snow, ice, or other slippery material, do not begin working on the scaffold until you have removed the hazard.

This is a small list. However, a great many accidents can be prevented by training and vigilance on the jobsite.

NOTES

14

RESCUE

Emergency!!! We have a fallen worker hanging from a bridge or building. What do we do next? As the clock ticks, if we react wrong or not at all it could cause the fallen worker more injury or even possible death. This scenario can happen and does. A good fall protection plan must include a fall rescue plan. First and foremost we must rapidly contact the emergency services or whomever the employer has designated as the rescue responder. Then it is not a bad idea to standby and render support as requested. It is also a good idea to have a basic understanding of fall rescue methods. Remember to call.



Basic fall rescue information

The following descriptions and illustrations are for general informational use only and are not instructions for use. Proper training and extreme care are mandatory for all rescue operations. When a rope fails during a rescue, tragedy is often the result. Therefore when ropes and other rescue equipment are used in rescue the knowledge of potential falls and rescue techniques must be addressed prior to placing the worker in the fall hazard. The equipment that is on hand must also be verified by the manufacturer that it can withstand the rescue stresses.



Rope is used for many purposes, but none are more critical than the rescue of a hanging or fallen worker. Some of the most common causes of accidental deaths are falls and being struck by falling objects. Rope can play an irreplaceable role in the rescue in all of these situations. During a rescue, the lives of the fallen worker and rescuer depend upon the strength and quality of the rope used. When a rope is placed into operation in the field, it is referred to as a "line".

Each of these rescue evolutions require anchoring lines to building components or deployment over edges such as cornices or sills. While it is widely known that even the best knots weaken rope by about 30% it is also true that deployment over an edge may stress rope to an even greater degree. Rope must be protected when stressed over edges as even the strongest can cut or abrade when deployed without proper padding.

Simple devices such as blankets, canvas etc. can be useful but are not always adequate for this purpose. In addition, synthetics such as rubber, plastic or nylon should not be used for padding as they may fuse to synthetic rope when friction occurs. A turnout coat is often used as an improvised edge protector, however better devices are needed.

NOTE: At all times the rescuer should be wearing the proper PFAS.



Belaying

A safety-line is fixed to a rescuer and/or victim exposed to danger of falling for the purpose of arresting a fall should it occur. A belayer controls the line from a secure position.

Analysis

Arresting a fall is the most severe test of a rope as dynamic loads of several thousand pounds can be developed by the person(s) falling.

Repelling

A rescuer slides down a life-line fixed at the upper end using a mechanical friction device to control his descent. A victim may be picked up by the rescuer and both then removed to a lower point.

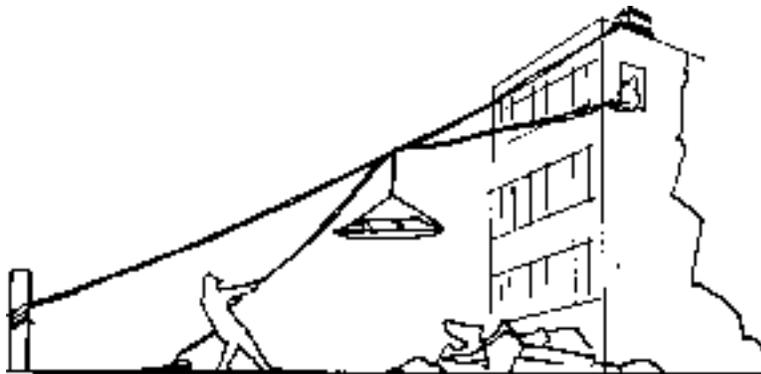


Analysis

This evolution generally presents a static rather than a dynamic load upon the rope. For this reason, rope with a low elongation characteristic is preferred.

Suspension Traverse

With a telpher-line describing a curve fixed between two anchor points, a rescuer and/or victim travel on a moving pulley or snaplink which slides along the fixed line and is moved via gravity or manual haulage. The telpher-line can be deployed either horizontally or at an angle.



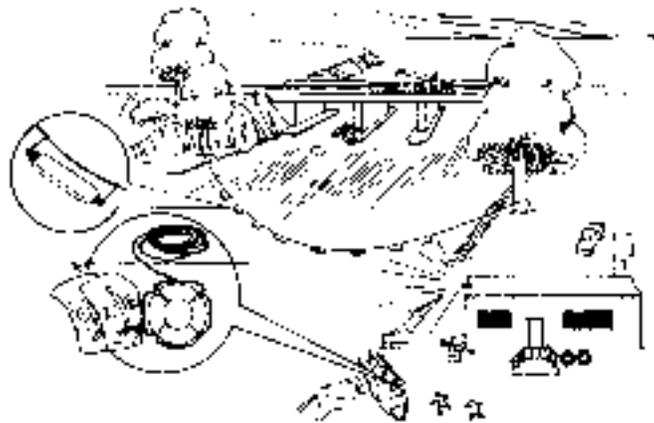
Analysis

Great care must be taken to avoid over-tensioning telpher-lines, since with even a moderate load an over-tightened line can easily fail. More than two persons should never be placed on such a line at one time. Under no circumstances should these lines be “pre-tensioned” such as by electric winch or by pulling with an automobile or truck. Extreme care must be taken to insure that pulleys and snap-links bearing on the line do not become hot enough from frictional effects to cause deterioration of the rope fibers. Nylon or plastic pulleys should not be used for this operation, as they can melt when loaded.

Rescue When Working Over Water

Where personnel are exposed to falls and the risk of drowning, workers must be available for water rescue operations. All employees working over or near water must be supplied a U.S. Coast Guard approved life jacket or buoyant work vest. At least one lifesaving skiff and ring buoys with at least 90 feet of line must be readily available in case of an emergency. Distances between ring buoys shall not exceed 200 feet. It is smart to have an audible alarm in case of a fall to alert others. Also check all safety equipment and devices prior

to using and at least daily. If it is found to be defective it shall be removed from service, replaced, and/or repaired. Where there is a current, it is not a bad idea to have a single line that should be extended across the water downstream from all work locations and be fitted with buoys to prevent the fallen worker from floating farther downstream. It must also be securely fastened.



Analysis

Time is the most important factor. Assess the situation, sound the alarm, get to the worker, and provide first aid as required. Training and knowing what to do in case of a emergency are vital to the fallen worker's rescue.

SUMMARY

This is just a very brief address of fall rescue. However, this must become a part of all pro-active fall protection programs. First and foremost the employer and employee must know who to contact or what actions must be taken in case of a fallen or hung worker. No appropriate standards exist and many unsafe systems, devices and ropes are being marketed. In addition, many practices long considered standard for rescue service need to be critically evaluated. These practices as well as rope and equipment must be evaluated on all levels and standards developed that will provide the rescuer and the fallen or hung worker with an acceptable degree of safety.

15

GLOSSARY

ANCHORAGE means a secure point of attachment for lifelines, lanyards or deceleration devices.

BODY BELT (SAFETY BELT) means a strap with means both for securing it about the waist and for attaching it to a lanyard (positioning strap). To be used in positioning.

BODY HARNESS means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

BUCKLE means any device for holding the body belt or body harness closed around the employee's body.

CONNECTOR means a device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiners or it may be an integral component of the system (such as a buckle or D-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

CONTROLLED ACCESS ZONE (CAZ) means an area in which certain work (e.g. overhand bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.

DANGEROUS EQUIPMENT means equipment (such as pickling or galvanizing tanks, de-greasing units, machinery, electrical equipment, and other units) which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

DECELERATION DEVICE means any mechanism, such as a rope grab, rip-stitch lanyard, specially woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a

substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

DECELERATION DISTANCE means the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employees body harness attachment point at the moment of activation (at the onset of all arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

EQUIVALENT means alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

FAILURE means load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

FREE FALL means the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

FREE FALL DISTANCE means the vertical displacement of the fall arrest attachment point on the employee's body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

GUARDRAIL SYSTEM means a barrier erected to prevent employees from falling to lower levels.

HOLE means a gap or void 2 inches (5.2 cm) or more in its least dimension, in a floor, roof, or other walking/working surface.

INFEASIBLE means that it is impossible to perform the construction work using a conventional fall protection system (i.e. guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

LANYARD means a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

LEADING EDGE means the edge of a floor roof, or formwork for a floor or other walking/ working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed or constructed. A leading edge is considered to be an “unprotected side and edge” during periods when it is not actively and continuously under constriction.

LIFELINE means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

LOW-SLOPE ROOF means a roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

LOWER LEVELS means those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations pits, tanks, material, water, equipment structures, or portions thereof.

MECHANICAL EQUIPMENT means all motor or human propelled wheeled equipment used for roofing work, except wheelbarrows and mopcars.

OPENING means a gap or void 30 inches (75 cm) or more high and 18 inches (48 cm) or more wide, in a wall or partition, through which employees can fall to a lower level.

OVERHAND BRICKLAYING AND RELATED WORK means the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

PERSONAL FALL ARREST SYSTEM means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

POSITIONING DEVICE SYSTEM means a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

ROPE GRAB means a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

ROOF means the exterior surface on the top of a building. This does not include floors, or form work which, because a building has not been completed, temporarily become the top surface of building.

ROOFING WORK means the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

SAFETY-MONITORING SYSTEM means a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

SELF-RETRACTING LIFELINE/LANYARD means a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

SNAPHOOK means a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement; which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snaphooks are of the locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection.

STEEP ROOF means a roof having a slope greater than 4 in 12 (vertical to horizontal).

TOEBOARD means a low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

UNPROTECTED SIDES AND EDGES means any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches (1.0 m) high.

WALKING/WORKING SURFACE means any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing

steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

WARNING LINE SYSTEM means a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without the use of guardrail, PFAS, or safety net systems to protect employees in the area.

WORK AREA means that portion of a walking/working surface where job duties are being performed.