Fall Protection
Field Guide

Air Force

Why Fall Protection Is Required

Falls are among the most common causes of serious work-related injuries and deaths. Military services must set up the workplace to prevent employees from falling off of overhead platforms, elevated work stations or into holes in the floor and walls. To prevent personnel from being injured from falls, employers must:

- Guard every floor hole into which a worker can accidentally walk (using a railing and toe-board or a floor hole cover).
- Provide a guardrail around every elevated open-sided platform, unprotected floor or runway.
- Regardless of height, if a worker can fall into or onto dangerous machines or equipment (such as a vat of acid or a conveyor belt), employers must provide guardrails and toe-boards to prevent workers from falling and getting injured.
- Other means of Fall Protection that may be required on certain jobs include fall arrest, positioning or restraint systems, safety nets, stair railings and hand rails.

While the military services enjoy an excellent safety record, fall-related mishaps and their associated hazards are still a serious concern. The Department of Defense has experienced several fatalities and serious injuries due to fall from heights over the past few years. The concept of this guide is to provide military and civilian personnel a quick reference resource to help prevent fall-related injury and death, and awareness of personal Fall Protection equipment and systems.

Unless a particular Service dictates more stringent requirements than those prescribed by OSHA, personnel shall comply with the threshold height requirement of 4 feet, per OSHA 1910.23, Subpart D, Walking-Working Surfaces. Any deviation(s) from the 4-foot height must be approved by the particular Service's Chain of Command.

The 4-foot rule applies to all walking and working surfaces and includes open-sided floors, platforms, wall openings, stairways or roofs with a drop of 4 feet or more.

Exceptions:

- **Climbing** – OSHA-compliant ladders
- **Construction** – (6-foot – CFR 1926)

There is no safe distance from an unprotected side or edge of a roof or floor. The distance alone is ineffective to protect personnel from unprotected sides and edges. Also, there is no minimum time duration that allows exclusion of Fall Protection requirements (e.g., if a 2-minute job requires 15 minutes to establish Fall Protection).

Note: This guide is not all-inclusive for Fall Protection information. Personnel shall refer to their Service's regulations and/or instructions for specific information.

Fall Protection Requirements/Definitions

Each Military Service, having personnel working at heights, exposed to fall hazards and using Fall Protection equipment, is responsible for establishing, implementing and managing a Fall Protection program, which includes identification and elimination, prevention or control of fall hazards.

Fall Protection must be utilized to protect military/civilian personnel exposed to fall hazards on any elevated walking-working surface when there is a possibility of falling 4 feet or more to a lower level or where there is a possibility of a fall from any height onto dangerous equipment, into a hazardous environment or onto an impalement hazard.

Fall arrest equipment cannot be used at low elevations (i.e., 4 or 6 feet). The minimum clearance required for safely using fall arrest systems is approximately 11 feet, depending on the length and type of the energy-absorbing lanyard used (e.g., self-retracting devices), the height of anchorage point and available clearance. Other fall arrest systems will require more clearance.

Agencies may prescribe more stringent threshold requirements for federal employees as required, due to the site-specific needs.

Definitions and Nomenclature

- **Anchorage:** A secured structure that can safely withstand forces exerted by the activation of Fall Protection and rescue equipment. The structure can be in the form of a beam, girder, column or floor. Anchorage is either engineered or improvised.
- **Anchorage Connector:** A component or subsystem by which Fall Protection or rescue equipment is secured or attached to the anchorage. This can include a steel cable sling, tie-off adapter (anchor strap), load-rated hoist ring designed for construction applications, tripod, davit arm or any other device designed to suspend human loads and capable of withstanding forces generated by a fall.

- **Anchorage System:** A combination of anchorage and anchorage connector.
- **Available Clearance:** The distance from the walking-working surface or platform to the nearest obstruction that the end user/authorized person might contact during a fall.
- **Body Harness:** Means of configuration of connected straps secured about the employee in a manner that will distribute the arresting forces over at least the upper thighs, waist, shoulders, chest and pelvis, with means for attaching a lanyard to other components of the personal fall arrest system. Full-body harness is the only body support device allowed by OSHA or ANSI when a free-fall distance exceeds 2 feet.
- **Carabiner:** A connector component generally consisting of an oval- or trapezoidal-shaped body with a closed gate or similar arrangement. Only self-locking carabiners are acceptable for use.
- **Certification:** The act of attesting in writing that the established criteria have been met.
- **Certified Anchorage:** An anchorage for a fall arrest, positioning, restraint or rescue system that a Qualified Person for Fall Protection certifies to be capable of supporting the potential fall forces that could be encountered during a fall.
- **Clearance Requirement:** The distance below the end user that must be clear of obstructions in order to ensure that the end user/authorized person does not encounter any object or obstruction during a fall.
- **Competent Person (CP) for Fall Protection:**
  - ◇ **(Air Force)** – An individual who, by way of training and/or experience, is knowledgeable of applicable standards, is capable of identifying workplace hazards relating to the specific operation, is designated by the unit commander, unit representative or supervisor and has authority to take appropriate actions.
  - ◇ **(Department of the Navy [DON] and United States Army Corps of Engineers [USACE])** – A person designated by the Command to be responsible for the immediate supervi-

sion, implementation and monitoring of the Fall Protection program, who through training, knowledge and expertise is capable of identifying, evaluating and addressing existing and potential fall hazards and in the application and use of personal fall arrest and rescue systems, or any component thereof, AND who has the authority to take prompt corrective measures to eliminate or control the hazards of falling.

- **Deceleration Device:** Any mechanism, such as a fall arrester (rope grab), rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting devices, 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:** The vertical distance between the user's fall arrest attachment at the onset of fall arrest forces during a fall, and after the fall arrest attachment comes to a complete stop.
- **D-ring:** An integral "D" shaped connector typically used in harnesses, lanyards, energy absorbers, lifelines and anchorage connectors as an attachment point.
- **Designated Area Method:** A distinct area of a walking-working surface, delineated by a perimeter warning line, in which temporary work may be performed without additional Fall Protection. **The designated area method is used only for general industry work.**
- **End user of Fall Protection (Authorized Person):** A person who has been trained in the use of assigned Fall Protection equipment, including hands-on training and practical demonstrations in a typical fall hazard situation, and uses personal fall arrest or restraint/positioning equipment while performing work assignments at heights.
- **Fall Arrest System:** A combination of equipment and components such as full-body harnesses, lanyards, deceleration devices, anchorages and horizontal or vertical lifelines connected together, designed to stop a person from striking a lower level or an obstruction during a fall.

- **Fall Protection Program Manager:** A person assigned by the Command to be responsible for developing and managing the Fall Protection program at the Command.
- **Free Fall:** The act of falling before a personal fall arrest system begins to apply force to arrest a fall.
- **Free-Fall Distance:** The vertical distance from the onset of a fall to a point where a fall arrest system is activated or engaged. This is the vertical distance measured from the fall arrest attachment point on the employee's body harness at the onset of the fall to the point just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation that are exerting deceleration forces, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.
- **Guardrail System:** A passive Fall Protection system of horizontal rails and vertical posts that prevent a person from reaching a fall edge. Guardrail systems typically have a top-rail, a mid-rail, posts and toe-board.
- **Horizontal Lifeline:** A component of a horizontal lifeline subsystem, consisting of a flexible line with connectors or other coupling means at both ends for securing it horizontally between two anchorages or anchorage connectors.
- **Ladder Climbing (Safety) Device:** A device or climbing sleeve, connected to the front D-ring on the climber's full-body harness, which slides up or down a rigid rail or cable used as a fall arrest system. Should a fall occur, the device is designed to lock by inertia or cam action to arrest the fall.
- **Lanyard:** A fl line of rope, wire rope or strap that usually has a connector at each end for connecting the body support to a fall arrester, energy absorber, anchorage connector or anchorage.
- **Non-Certified Anchorage:** An unquestionably strong anchorage that a Competent Person judges to be capable of supporting the predetermined anchorage strength as prescribed by OSHA Standards and ANSI/ASSE Fall Protection Code. Non-certified

anchorages are used for fall arrest, work positioning, travel restraint or rescue.

- **Personal Fall Arrest System:** Assembly of components and subsystems used to arrest an end user/authorized person falling from height. It consists of an anchorage system, connecting means and full-body harness, and may include a lanyard, deceleration device, lifeline or suitable combination of these. Use of a body belt in a personal fall arrest system is prohibited.
- **Positioning System:** A combination of equipment including a full-body harness rigged to allow the end user/authorized person to work with both hands free while being supported on an elevated vertical work surface.
- **Qualified Person (QP) for Fall Protection:**
  - ◊ **(Air Force)** – A person who by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work or the project.
  - ◊ **(DON)** – A person with a recognized engineering degree or professional certificate and with extensive knowledge, training and experience in the Fall Protection and rescue field, who is capable of designing, analyzing, evaluating and specifying Fall Protection and rescue systems and equipment.
  - ◊ **(USACE)** – A person with a recognized degree or professional certificate and with extensive knowledge, training and experience in the Fall Protection and rescue field, who is capable of designing, analyzing, evaluating and specifying Fall Protection and rescue systems and equipment.
- **Restraint System:** A combination of devices designed to restrain an end user/authorized person from reaching an exposed fall hazard. The system consists of a full-body harness that can be secured around a worker and attached to a load-bearing anchorage in order to restrict travel and limit fall hazards. The lanyard can be single or multiple.

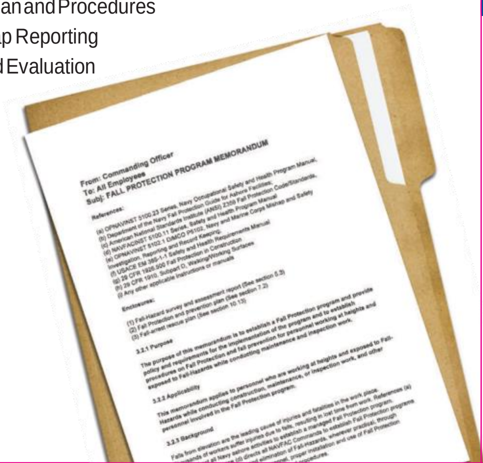
- **Self-Retracting Device (SRD):** A device that contains a drum-wound line that automatically locks at the onset of a fall to arrest the user, but that pulls out from and automatically retracts onto the drum during normal movement of the person to whom the line is attached. After onset of a fall, the device automatically locks the drum and arrests the fall. Self-retracting devices include self-retracting lanyards (SRLs), self-retracting lanyards with integral rescue capability (SRL-Rs) and self-retracting lanyards with leading edge capability (SRL-LEs), and hybrid combinations of these.
- **Self-Retracting Lanyard (SRL):** A device suitable for applications where during use, the device is mounted or anchored such that possible free fall is limited to 2 feet or less.
- **Self-Retracting Lanyard with Leading Edge Capability (SRL-LE):** A self-retracting device, used for horizontal applications, which is mounted or anchored at "foot" level and where there is the possibility of free fall. The device includes integral means to withstand impact loading of the line contiguous with a sharp or abrasive edge during fall arrest and for controlling fall arrest forces on the user. The device can also be used for vertical applications where it is mounted overhead.
- **Single Anchor Vertical Lifeline (VLL):** A vertically suspended flexible line connected at the upper end for fastening to an overhead anchorage and along which a fall arrester travels.
- **Snaphook:** A connector comprised of a hook-shaped body with a normally closed gate or similar arrangement, which may be opened to permit the hook to receive an object, and when released, automatically closes to retain the object. Only self-locking (single- or double-locking) snaphooks are acceptable for use.
- **Warning Line System:** A barrier erected on a roof to warn workers that they are approaching an unprotected side or roof edge, and which designates an area where roof work may take place without the use of guard, fall arrest or safety net systems to protect workers in the area. Work performed outside barriers will require Fall Protection. A warning line system is used during construction work.

Fall Protection Program Requirements

OSHA Federal Regulations prescribe specific requirements for federal employment occupational safety and health programs and contain provisions to assure safe and healthful working conditions for federal employees. Falls are preventable. Careful planning and preparation lay the necessary groundwork for an accident-free workplace. Services that have personnel working at heights and exposed to fall hazards are required to establish and implement a Fall Protection program.

Components of a Fall Protection Program

- Service Policy
- Duties and Responsibilities
- Workplace Surveys and Assessment of fall hazards
- Fall Hazard Prevention and Control, including the preparation of site-specific Fall Protection and Prevention Plans
- Training Requirements
- Inspection, Storage, Care and Maintenance of Personal Fall Protection Equipment
- Rescue Plan and Procedures
- Fall Mishap Reporting
- Audits and Evaluation



Roles and Responsibilities

Services shall outline duties and assign responsibilities to the qualified and trained personnel involved in the development, management and implementation of the Fall Protection program. Services shall ensure that assigned personnel have the necessary skills, knowledge, training and expertise to manage, administer and implement the Fall Protection program.

Program Manager/Supervisor – The duties and responsibilities of the Program Manager/Supervisor include but are not limited to the following:

- Develop and manage the Fall Protection program at the Service.
- Ensure all personnel exposed to fall hazards and using Fall Protection equipment are adequately trained before using the equipment.
- Ensure other personnel involved in the Fall Protection program are adequately trained.
- Develop overall Fall Protection training programs.
- Develop and approve equipment purchase list.
- Evaluate Fall Protection program effectiveness.

The Fall Protection Program Manager/Supervisor, through training, knowledge and expertise, should be able to identify, evaluate and address existing and potential fall hazards.

Competent Person – The duties and responsibilities of the Competent Person for Fall Protection include the following:

- Immediate supervision, implementation and monitoring of the Fall Protection program.
- Preparation and implementation of:
  - ◊ Fall Protection and Prevention Plans
  - ◊ Fall Arrest Rescue Plans and Procedures
- Identify hazardous and dangerous conditions in the workplace and take prompt corrective measures to correct them.
- Conduct fall hazard survey and prepare survey and assessment report.

- Inspection and installation of approved Fall Protection systems.
- Compliance with Fall Protection and Prevention Plans and Fall Arrest Rescue Plans.
- Ensure end users/authorized persons working at heights and using Fall Protection equipment are adequately trained.
- Supervise the selection, installation and inspection of non-certified anchorages.
- Supervise the installation, use and inspection of certified anchorages, under the direction of the Qualified Person for Fall Protection.
- Have knowledge and understanding of Fall Protection systems and equipment.
- Conduct inspection and accident investigations.
- Have full responsibility and authority to implement the Fall Protection and Prevention Plans and Fall Arrest Rescue Plans and Procedures.
- Knowledgeable of all the Fall Protection regulations and standards.
- Have only one task on-site, which is to monitor employee compliance with Fall Protection and Prevention Plan and Fall Arrest Rescue Plan requirements.

Qualified Person – The duties and responsibilities of the Qualified Person for Fall Protection include the following:

- Responsible for supporting the Fall Protection program.
- Prepare, review, approve and modify:
  - ◊ Fall Protection and Prevention Plans
  - ◊ Fall Arrest Rescue Plans and Procedures
- Design, select, certify, evaluate and analyze Fall Protection systems and equipment.
- Supervise the design, selection, installation and inspection of certified and non-certified anchorages, horizontal lifelines and other engineered systems.

- Involved in the evaluation and determination of fall arrest system usage when the free-fall distance exceeds 6 feet.
- Review, prepare and approve Fall Protection project specifications.
- Prepare contract documents for Fall Protection systems.
- Knowledgeable of all the Fall Protection standards and regulations.
- The Qualified Person shall also meet the qualifications of a Competent Person.

Duties and Responsibilities	Program Manager/Agency	Supervisor (Air Force)	Competent Person (DON and USACE)	Qualified Person (DON and USACE)	Competent Person (Air Force)	Qualified Person (Air Force)	End User/Authorized Person
Develop and manage the Fall Protection program at the Service	■						
Ensure all personnel exposed to fall hazards and using Fall Protection equipment are adequately trained before using the equipment	■	■					
Ensure other personnel involved in the Fall Protection program are adequately trained	■	■					
Develop overall Fall Protection training programs	■						
Develop and approve equipment purchase list	■	■					
Evaluate Fall Protection program effectiveness	■	■					

Identify, evaluate and address existing and potential fall hazards	■	■					
Immediate supervision, implementation and monitoring of the Fall Protection program			■		■		
Preparation and implementation of: • Fall Protection and Prevention Plans • Fall Arrest Rescue Plans and Procedures			■		■		
Identify hazardous and dangerous conditions in the workplace and take prompt corrective measures to correct them			■		■		
Conduct fall hazard survey/JSA and prepare survey and assessment report		■	■				
Inspection and installation of approved Fall Protection systems			■			■	
Compliance with Fall Protection and Prevention Plans and Fall Arrest Rescue Plans			■		■		
Ensure end user/authorized persons working at heights and using Fall Protection equipment are adequately trained		■	■		■		
Supervise the selection, installation and inspection of non-certified anchorages			■			■	
Supervise the installation, use and inspection of certified anchorages, under the direction of the Qualified Person for Fall Protection			■			■	
Have knowledge and understanding of Fall Protection systems and equipment		■	■	■	■	■	
Conduct inspection and accident investigations		■	■				
Have full responsibility and authority to implement the Fall Protection and Prevention Plans and Fall Arrest Rescue Plans and Procedures		■	■				
Knowledgeable of all the Fall Protection regulations and standards		■	■	■	■	■	
Have only one task on-site, which is to monitor employee compliance with Fall Protection and Prevention Plan and Fall Arrest Rescue Plan requirements			■		■		

Duties and Responsibilities	Program Manager/Agency	Supervisor (Air Force)	Competent Person (DON and USACE)	Qualified Person (DON and USACE)	Competent Person (Air Force)	Qualified Person (Air Force)	End User/Authorized Person
Responsible for supporting the Fall Protection program				■		■	
Prepare, review, approve and modify: • Fall Protection and Prevention Plans • Fall Arrest Rescue Plans and Procedures		■		■			
Design, select, certify, evaluate and analyze Fall Protection systems and equipment				■		■	
Supervise the design, selection, installation and inspection of certified and non-certified anchorages, horizontal lifelines and other engineered systems		■		■		■	
Involved in the evaluation and determination of fall arrest system usage when the free-fall distance exceeds 6 feet				■		■	
Review, prepare and approve Fall Protection project specifications				■		■	
Prepare contract documents for Fall Protection systems		■		■			
The Qualified Person will also meet the qualifications of a Competent Person				■		■	
Receive training in the use of assigned Fall Protection equipment, including hands-on training and practical demonstrations in a typical fall hazard situation							■
Use personal fall arrest or restraint/ positioning equipment while performing work assignments at heights							■

Identifying and Evaluating Fall Hazards

Each Service will ensure that the workplace identify potential fall hazards, if guidance is not available, and will use survey, analysis and assessment to help identify potential fall hazards in the workplace. Different methods to identify and evaluate fall hazards may be used, but each method will assist in the development of viable solutions to protect personnel exposed to fall hazards. Understanding work procedures and how a person conducts the required task is very important in the selection and development of the most appropriate Fall Protection method.

Developing a Fall Hazard Survey Report

In developing a survey report, the following should be noted:

- The survey shall be conducted for each fall hazard to which a person may be exposed.
- Identify one or more methods to eliminate or control fall hazards.
- A person who is familiar with building operations and work procedures should accompany the individual conducting the survey.
- Include pertinent information about the type of fall hazard, showing basic configuration (graphic/drawings/photos).
- Identify environmental factors that may affect the building/facility.
- Establish risk factors to assist in the hazard ranking.
- Interview personnel that will be working at heights and exposed to fall hazards.

- Include an assessment of the operation and fall hazard encountered.
- Address why active and passive Fall Protection systems are not feasible or would create a greater hazard.
- Describe the Fall Protection measures available and each location where conventional Fall Protection methods cannot be used (these will become controlled access zones).
- Include a corrective action plan describing planned upgrades (equipment, cost and timetable, prioritized by the shop) and appropriate Risk Assessment Codes (RACs), to partially or totally eliminate the need for procedural controls.
- Revise the report whenever there is a change in work procedure/task equipment or requirements that will render the previous report obsolete.
- Fall Hazard Assessments – After a fall hazard survey is conducted at a workplace, a fall hazard analysis can be performed to assess the risk, hazard severity and fall mishap probability. This will help in hazard ranking and selection of the most viable Fall Protection solutions. The primary consideration is to eliminate/remove potential fall hazards from the workplace.

Note: The survey can be conducted by the Program Manager or the Competent Person for Fall Protection. The Competent Person can train and delegate another person to conduct the survey.

(Air Force) A Job Safety Analysis (JSA) is performed when procedural controls are the only practical means of providing Fall Protection. Implementation of the JSA shall be under the supervision of a Competent Person. Procedures and equipment identified in the JSA shall be considered the minimum mandatory requirements for operations covered in the JSA.

Training Requirements

Initial Training

Personnel working at heights who are exposed to fall hazards and using Fall Protection equipment, or other personnel involved in the Fall Protection program, will be trained to recognize the hazards of falling in the workplace and how to minimize such hazards.

Before using Fall Protection equipment, the employee (end user/authorized person) must be trained on the safe use of the equipment. The end user/authorized person training will include hands-on training and practical demonstrations. The end user/authorized person will be trained by a person who has the knowledge, expertise and education to deliver the training. Hands-on training and practical demonstrations will be conducted by the Competent Person for Fall Protection.

Refresher/Update Training

Personnel exposed to fall hazards will receive Refresher/Update Training on the safe use of Fall Protection equipment and rescue as follows:

- **End user/authorized person, Competent Person for Fall Protection and authorized rescuer** (person who conducts rescue)
  - ◊ Refresher/Update Training is required, and will be conducted at least every two years, to stay current with Fall Protection and rescue educational requirements.
- **Program Manager/Supervisor and the Qualified Person for Fall Protection**
  - ◊ Refresher/Update Training is recommended once a year.

Retraining

Retraining in relevant topics will be provided to the end user/authorized person when:

- Observed using Fall Protection equipment in an unsafe manner.

- Been involved in a mishap or a near-miss incident.
- Received an evaluation that reveals that he or she is not using the Fall Protection equipment properly.
- Assigned a different type of Fall Protection equipment, and/or a condition in the workplace changes in a manner that could affect the safe use of the Fall Protection equipment.

Fall Protection Training Requirements and Methods

Desired Training Objectives	Training Mechanism/Type and Hours/Frequency
End User/Authorized Person	
• Selection and safe use of equipment • Application limits • Proper anchoring and tie-off techniques • Estimation of fall distances • Determination of deceleration distance • Total fall distance • Methods of inspection • Storage, care and maintenance of equipment • Applicable regulations • Limitations of equipment • Specific lifelines • Rescue and self-rescue techniques • Recognize fall hazard deficiencies • Recognize fall risks at work site	Hands-on training and practical demonstrations (a must) for using local equipment or on-site training as applicable to the activity.
DON personnel	16 hours or as appropriate
USACE personnel Air Force personnel	In accordance with directives/ instructions

Construction Management Personnel	
• Recognize fall hazard deficiencies • Recognize fall risks at work site • Basic Fall Protection systems and equipment • Methods of use • Proper anchoring and tie-off techniques • Methods of inspection and record keeping • Storage of the equipment • Applicable regulations • Rescue equipment and procedures	
DON personnel	4 hours minimum – part of the 40 hours of Construction Safety Training
USACE personnel Air Force personnel	In accordance with directives/ instructions

Competent Person	
• Implementation of various Fall Protection systems • Proper donning of the equipment • Proper inspection and record keeping • Recognition and identification of fall hazards at work site • Verification of proper equipment installation techniques • Confirmation of proper anchoring and tie-off techniques • Assessment of risk and hazard ranking • Preparation, updating, review and approval of Fall Protection and Prevention Plans, and rescue and evacuation plans • Assurance of understanding of Fall Protection regulations and standards by personnel to be exposed to fall hazards • Review and approval of plans and specifications	In addition to the end user training, includes hands-on training and practical demonstrations.

Desired Training Objectives	Training Mechanism/Type and Hours/Frequency

(Competent Person Training Methods and Requirements continued)

DON personnel	40 hours minimum as approved by ECHELON II in accordance with OPNAVINST 5100.23
USACE personnel	Minimum 24 hours and in compliance with ANSI/ASSE Z359.2 Standard
Air Force personnel	In accordance with directives/ instructions

Qualified Person	
• Design, select, analyze and certify Fall Protection systems and equipment • Prepare, update, review and approve Fall Protection and Prevention Plans, and rescue and evacuation plans • Assure understanding of Fall Protection regulations and standards by personnel to be exposed to fall hazards • Review and approve plans and specifications	
DON personnel	40 hours or as appropriate, as approved by ECHELON II in accordance with OPNAVINST 5100.23

USACE personnel Air Force personnel	In compliance with ANSI/ASSE Z359.2 Standard and Services requirements

Fall Protection Program Managers/Agency	
• Recognize and identify fall hazards at workplaces • Understand best practices, criteria and requirements for development and managing Fall Protection program • Risk assessment and hazard ranking • Understand and identify selection, safe use and limitation of Fall Protection systems and equipment • Understand proper storage, care and maintenance of the equipment • Identify applicable Fall Protection regulations • Audit and evaluate program criteria • Understand duties, responsibilities and training requirements for personnel involved in the Fall Protection program	
DON personnel	16 hours minimum or as appropriate
USACE personnel Air Force personnel	In compliance with ANSI/ASSE Z359.2 Standard and Services requirements

Desired Training Objectives	Training Mechanism/Type and Hours/Frequency
End User/Authorized Person Refresher/Update Training	
• Select and use equipment safely • Understand and apply application limits • Employ proper anchor and tie-off techniques • Carefully estimate potential fall distances • Determine deceleration distance • Calculate total fall distance • Understand and apply proper methods of inspection • Apply proper storage, care and maintenance of the equipment • Implement applicable regulations • Recognize limitations of equipment • Understand the use and limits of specific lifelines • Reinforce understanding of rescue and self-rescue techniques • Recognize fall hazard deficiencies	Competent Person determines if hands-on training and practical demonstrations will be required.
DON personnel	Every 2 years
USACE personnel	As necessary, to maintain an understanding of these objectives. Minimum 1 hour (EM 385-1-1, 21.C)
Air Force personnel	Annually, when work conditions change or new fall arrest systems are used.

Competent Person Refresher Training	
• Stay current with the Fall Protection and rescue educational requirements • Acquire knowledge and understanding of the best Fall Protection practices and application of Fall Protection and rescue equipment and systems	Applicable technical seminars or web-based training
DON personnel	Every 2 years to stay current with Fall Protection educational knowledge.
USACE personnel	As necessary, to maintain an understanding of these objectives. Minimum 2 hours (USACE EM 385, Section 21.C)
Air Force personnel	Annually, when work conditions change or new fall arrest systems are used.

Fall Hazard Prevention and Control

Hierarchy of Fall Hazard Controls/Preferred Order of Control Measures

The preferred order of control measures for fall hazards is:

1. **Elimination** – Removal of the hazard from a workplace. This is the most effective control measure (e.g., lowering devices or instruments installed at high locations, such as meters or valves, to the height level of the individual, instead of servicing such devices or instruments at heights).
2. **Prevention** – The isolation or separation of the hazards from the general work area (e.g., same-level barriers such as guard-rails, walls, covers or parapets).
3. **Engineering Controls** – Where the hazard cannot be eliminated, isolated or separated, engineering control is the next preferred measure (e.g., design change or use of various equipment or techniques, such as aerial lift equipment or movable and stationary work platforms).
4. **Administrative Controls** – This includes introducing new work practices that reduce the risk of a person's falling (e.g., erecting warning lines or designated areas, restricting access to certain areas or posting of warning signs).
5. **Personal Protective Systems and Equipment** – These will be used after other control measures (such as eliminating or isolating fall hazards) are determined not to be practical, or when secondary systems are needed (e.g., when it is necessary to increase protection by employing a backup system).

Note 1: A different hierarchy is followed for the Army Corps of Engineers: (1) Elimination, (2) Prevention, (3) Work Platforms, (4) Personal Protective Systems and Equipment and (5) Administrative Controls.

Note 2: Control measures are not mutually exclusive. There may be situations in which more than one control measure should be used to reduce the risk of a fall.

Services will select Fall Protection measures compatible with the type of work being performed. If fall hazards cannot be eliminated, Fall Protection can be provided through the use of Fall Protection systems and equipment.

Fall Protection and Prevention Plan Requirements

The Fall Protection and Prevention Plan is a document that includes written procedures for performing a specific work, task or project, indicating the proper way of using safe Fall Protection systems and equipment and including any other relevant information; however, it is a requirement to develop a Fall Protection and Prevention Plan for routine and non-routine tasks.

Personnel shall refer to their Service's regulations and/or instructions for specific information.

Site-Specific Fall Protection and Prevention Plan/ Written Fall Protection Procedures

If guidance does not already exist, the Qualified or Competent Person for Fall Protection will be responsible for preparing the Fall Protection and Prevention Plans, as well as making any required changes, designs, updates or approvals pertaining to Fall Protection systems and equipment. If the plan includes Fall Protection components or systems requiring direction, supervision, design calculations or drawings by a Qualified Person for Fall Protection, the name, qualifications and responsibilities of the Qualified Person will be recorded in the plan.

Fall Prevention Systems

It is very important for a Qualified or Competent Person for Fall Protection to plan, evaluate, design and select the most appropriate, safe and efficient Fall Protection system. There are many Fall Protection systems available. It is highly important to select the right system for a specific work application. A complete understanding of work procedures will enable the Qualified Person for Fall Protection or Competent Person for Fall Protection to select the most appropriate Fall Protection system.

In every fall hazard situation, it is always advisable to have two protective systems: primary and secondary, as backup. If the primary system fails, the secondary system will protect the employee from falling. For example, when approaching an unprotected side or edge of a roof, the employee's primary protective system is his/her feet. A secondary protective system is required as backup, such as a fall arrest/restraint system, or guardrails. When climbing a fixed ladder or a pole, the employee's primary fall protective system is his/her hands and feet. A climbing-ladder fall arrest system or a self-retracting lanyard is required as a secondary backup system.

Fall Protection Systems – Every employee on a walking-working surface exposed to a fall hazard will be protected from falling to a lower level by the use of a Fall Protection system. Common Fall Protection systems are:

- Prevention Systems – Guardrail Systems, Covers, Work Stands/Stationary Work Platforms and Catwalks
- Safety Nets
- Fall Arrest System
- Other Fall Protection Systems include:
  - ◊ Horizontal Lifeline
  - ◊ Single Anchor Vertical Lifeline
  - ◊ Climbing-Ladder Fall Arrest System (ladder climbing device)
  - ◊ Positioning System
  - ◊ Restraint Systems
  - ◊ Rope Access
  - ◊ Aerial Lifting Equipment
  - ◊ Movable Working Platforms or Scaffolds (e.g., AWP work stands or scissor lifts)
  - ◊ Warning Systems
  - ◊ Designated Area Method
  - ◊ Monitoring System
  - ◊ Controlled Access Zone
  - ◊ Other Engineered Fall Protection Systems

Prevention Systems (Passive Fall Protection Systems)

- **Guardrail System** – A Guardrail System is a conventional method for the prevention of falls from heights that is installed at all open-sided floors, openings and platforms where a person is required to walk or work. Guardrails can be temporary or permanent. Guardrails consist of top-rail, mid-rail, posts (stanchions) and toe-board. The top rail will be 42 inches (+/- 3 inches), mid-rail shall be located halfway between the top rail and the walking-working surface and toe-board shall be 3.5 inches high. Posts will be spaced no more than 8 feet apart.
- **Stair Rails and Handrails** – Permanent handrails will be mounted 34–38 inches high (the top of the rail). For temporary handrails, the height may be 30–37 inches. Permanent stair rails shall be 42 inches high.
- **Parapets** – For existing parapet walls with heights of less than 42 inches, the parapet wall may be used as a Fall Protection system if the vertical height is a minimum of 30 inches and the width a minimum of 18 inches at the top of the wall for a total of 48 inches combined.
- **Covers** – Install a cover on any hole 2 inches or more in its least dimension. All covers shall be capable of supporting, without failure, at least twice the weight of the employees, equipment and materials that may be imposed on the cover at any time. Covers will be secured in place when installed. When covers are removed, a guardrail, attendant or other system shall be provided to protect floor holes and openings.
- **Work Stands, Scaffolding, Stationary Work Platforms and Catwalks** – Work stands, scaffolding, stationary work platforms and catwalks shall be equipped with guardrails or other Fall Protection system(s). For safer work stands, provide a swing gate at the platform level near the stairs to prevent a worker from unintentionally moving backward and falling down the stairs.

Fall Arrest Systems (Active Fall Protection Systems)

Fall Arrest Systems consist of the following subsystems and components:

- **Anchorage System** – Consists of anchorage and anchorage connector
- **Connecting Means** – Includes energy-absorbing lanyard with snaphook or carabiner at each end or self-retracting device. The subsystem may also include fall arrester.
- **Body Support** – Consists of full-body harness with integral dorsal D-ring.
- **Rescue Procedures** – Consist of self-rescue or assisted rescue

Personal fall arrest systems (PFAS) are typically certified and labeled only within the capacity range of 130 to 310 pounds (59 to 140.6 kg) including the weight of the worker, equipment, clothing and tools. Workers shall not be permitted to exceed the 310-pound weight limit, unless the harness and the lanyard are specified in writing by the manufacturer. For workers with body weight less than 130 pounds, a specially designed harness and a specially designed energy-absorbing lanyard, which will properly deploy if this person were to fall, shall be utilized.

Fall Arrest System Requirements

OSHA Requirements are:

- The system shall limit the maximum arrest force on the worker's body to 1,800 pounds when wearing a full-body harness.
- Maximum free-fall distance shall be 6 feet.

- The system shall stop the fall within a deceleration distance of not more than 42 inches.
- The system shall prevent the worker from contacting a lower level or object.

Note: OSHA Standards and the ANSI Z359 Fall Protection Code/Standards permit the free-fall distance to exceed 6 feet and up to 12 feet, provided the maximum arrest force on the body does not exceed 1,800 pounds. Only the Qualified Person for Fall Protection can make this determination (increasing the free-fall distances to more than 6 feet and using the 12-foot free-fall energy-absorbing lanyard). The 6-foot free-fall distance can be exceeded provided the proper energy-absorbing lanyard is used.

Fall Arrest Subsystem and Components

All personal fall arrest equipment used shall meet the requirements of ANSI Z359 Fall Protection Code/Standards. Any equipment meeting ANSI A10.14 or ANSI Z359.1 (1992 Revised 1999) shall not be used and shall be removed from service.

Anchorage System for Fall Arrest

a. **Anchorage** is any rigid part of a building or structure such as a beam, column, floor or equipment and shall withstand a minimum force (breaking strength) of 5,000 pounds, or engineered (designed) for twice the maximum arresting force by the Qualified Person for Fall Protection.

b. **Anchorage connector** is intended for attaching the personal fall arrest system to the anchorage, shall meet the requirements of the anchorage and withstand a force of 5,000 pounds.

Note: Always consider the compatibility between the anchorage and anchorage connector to prevent unintentional disengagement.

Connecting Means

a. **Snaphooks and Carabiners:**

- Shall have a minimum strength of 5,000 pounds.
- The gate shall withstand a minimum force of 3,600 pounds when applied in any direction, and shall meet the requirement of ANSI Z359 Fall Protection Code/Standards.
- Snaphooks and carabiners shall be sized to be compatible with the connectors to which they are connected. Compatible connections will prevent unintentional disengagement.
- Snaphooks and carabiners shall be self-closing and self-locking, capable of being opened by at least two consecutive deliberate actions. The non-locking types are prohibited.

Snaphooks and carabiners having side-loading gate strength of 350 pounds (manufactured per ANSI Z359.1 [1992, R1999]) shall not be used.

b. **Energy-Absorbing Lanyards:**

- The length of the lanyard used in fall arrest shall not exceed 6 feet.
- The strength of the lanyard and the energy absorber shall be 5,000 pounds minimum.
- The minimum diameter of a synthetic rope lanyard is 1/2 inch.
- Provide energy absorbers (shock absorbers) with lanyards (integral in-line is preferred).
- There are two types of single and "Y" energy-absorbing lanyards:

1. **6-foot Free-Fall Energy-Absorbing Lanyard:** The 6-foot free-fall (FF) energy-absorbing lanyard shall be used only when the tie-off point is located above the dorsal D-ring, creating a FF distance of less than 6 feet. The average arresting force on the body shall not exceed 900 pounds (4 kN) under ambient dry conditions, and 1,125 pounds under ambient wet conditions. The maximum deployment distance of the energy absorber shall be 4 feet, which is greater than the OSHA requirement of 3 1/2 feet.
2. **12-foot Free-Fall Energy-Absorbing Lanyard:** When an anchor point is below the dorsal D-ring, a FF distance greater than 6 feet is created. For these situations, a 12-foot FF energy-absorbing lanyard shall be used in accordance with manufacturer's instructions and recommendations. The average arresting force on the body shall not exceed 1,350 pounds (6 kN) under ambient dry conditions, and 1,575 pounds under wet conditions. The maximum deployment distance of the energy absorber shall be 5 feet. The 12-foot FF energy-absorbing lanyard shall be used when the tie-off point is below the dorsal D-ring.

Note 1: A 12-foot FF energy-absorbing lanyard does not refer to the lanyard length. Instead it refers to a free fall that is greater than 6 feet (up to 12 feet), which is created by the anchor points being located below the dorsal D-ring. The maximum lanyard length shall not exceed 6 feet. (Personnel whose body weight and equipment exceed 310 pounds shall not be permitted to use the 12-foot FF energy-absorbing lanyard; always refer to equipment labels and manufacturer's instructions, restrictions and recommendations).

Note 2: The deployment distance for the 6-foot FF and 12-foot FF energy absorbers is very critical when calculating the required clearance for the fall arrest system.

- **Warning:** When using the 6-foot or 12-foot FF "Y" lanyards, do not attach the unused leg of the "Y" lanyard to any part of the harness except to attachment points specifically designated by the manufacturer; especially the "Y" lanyard having a single common energy absorber. The joint between the two legs shall be designed for 5,000 pounds. It is highly recommended to use a "Y" lanyard having legs that expand and contract (retractable). When traversing, do not connect to anchorages that are farther away than the lanyard length, and do not allow the legs of the lanyard to pass under arms, between the legs or around the neck of the end user. Do not use a 6-foot FF energy-absorbing "Y" lanyard if the FF distance is greater than 6 feet.
- A lanyard strap shall not be wrapped around a tie-off point and then attached back to itself, unless it is a tieback lanyard where the lanyard straps have been designed accordingly.
- The snaphook shall be secured only to an integral D-ring (incorporated into the body harness by the manufacturer).
- All equipment shall have permanently attached labels indicating the manufacturer's name, serial number or lot number, date of manufacture, capacity and that applicable OSHA and ANSI Z359 Fall Protection Code/Standards have been met. The label of 6-foot FF energy-absorbing lanyard shall have a white background with black lettering and the 12-foot FF energy-absorbing lanyard shall have a black background with white lettering.

12 ft Free Fall Energy Absorber Label 6 ft Free Fall Energy Absorber Label

c. **Self-Retracting Devices (SRDs):**

SRDs are deceleration devices made of synthetic rope, webbing or wire rope. There are four types of SR Ds:

•Self-Retracting Lanyard (SRL)

1. Maximum arrest distance shall not exceed 2 feet.
2. The average arrest force on the body shall not exceed 1,350 pounds.
3. The maximum peak force shall not exceed 1,800 pounds.
4. SRL shall be used only in vertical applications (use for fall arrest and where the tie-off point is located above the dorsal D-ring).
5. The activation force required to deploy the energy absorber shall be less than 450 pounds.

• Self-Retracting Lanyard with Leading Edge Capability (SRL-LE)

1. Maximum arrest distance of 4.5 feet
2. Free-fall distance of 5 feet
3. Average arrest force on the body of 900 pounds
4. Equipped with energy absorber (a pouch made of stitched fabric)
5. Used in vertical and horizontal applications (may be used in fall arrest and restraint systems)

- **Self-Retracting Lanyard with Rescue Capability (SRL-R)**
  1. Minimum static strength of 3,000 pounds
  2. Minimum mechanical advantage of 3:1

- **Hybrid Self-Retracting Devices**
  1. Any combination of two types of the above Self-Retracting Devices.

d. **Fall Arresters (FA):**

A fall arrester is a device that travels on a lifeline and will automatically engage the rope or cable and is designed to lock off by inertia to arrest a fall. The device is also called a rope or cable grab. Fall arresters shall be used on single anchor vertical lifeline and climbing-ladder fall arrest systems.

- **Automatic Rope Grab** is best for hands-free operation, used only in vertical climbing and descending. The device uses inertia locking mechanisms, which rely on the rate of acceleration to lock (simply follows the workers as they climb or descend without holding on to the device).

- **Manual Rope Grab**, also called a rope adjuster, is used in work positioning and travel restraint applications.

Body Support

a. **Full-Body Harness:** Straps connected together to contain the torso and distribute the arresting fall forces over the upper thighs, waist, shoulders, chest and pelvis. There are two styles of harnesses: the first one is the crossover style and the second is the chest strap.

- Maximum arresting force on the body shall not exceed 1,800 pounds.
- Shall be equipped with a dorsal D-ring integrally attached at the upper back between the shoulder blades, or a D-strap incorporated into the full-body harness.
- Shall have permanently attached labels stating the manufacturer's name, serial number or lot number, date of manufacture, capacity, annual Competent Person inspection and that it meets OSHA & ANSI Z359 Fall Protection Code/Product Standards requirements.
- The capacity range, including weight of the user, clothing and tools, shall be from 130 to 310 pounds.
- All straps must be connected together properly.
- Conduct a buddy check to make sure the harness is properly donned and connected.

- Lineman's equipment (use electrically rated harnesses meeting ASTM F887 and ANSI Z359 Fall Protection Code/Standards). The full-body harness used around high voltage equipment or structures shall be an industry-designed "lineman's Fall Protection harness" that will resist arc flashing and shall have either straps or plastic coated D-rings and positioning side-rings in lieu of exposed metal D-rings and exposed metal positioning side-rings. All other exposed metal parts of the lineman's harnesses shall also be plastic coated (e.g., buckles and adjusters). There shall be no metal above the waist.
- Criteria for donning full-body harness: It is very important and critical that the harness shall snugly fit the body. The user shall be able to reach the dorsal D-ring with his or her thumb. There shall be a maximum four flat fingers of slack between the legs and the leg straps. Ensure that the chest strap is across the chest/breast bone.

b. **D-rings and Connectors:**

- Shall have a minimum tensile strength of 5,000 pounds.
- Shall be drop-forged, pressed or formed steel.
- Shall have corrosion-resistant finish.

c. **D-ring locations on the body harness and uses:**

- Dorsal: Fall arrest, restrain and rescue
- Sternal: Limited fall arrest, climbing-ladder FA system and positioning and rope access
- Frontal: Climbing-ladder FA system
- Rear Waist: Restraint
- Hip (Pairs): Positioning
- Shoulder (Pairs): Rescue, entry and retrieval
- Saddle (Pairs): Positioning

Positioning System

A positioning system consists of a body harness and a short lanyard attached to a vertical work surface. Although allowed by OSHA, ANSI Z359 Fall Protection Code/Standards do not permit the use of a body belt by itself; at a minimum, the body belt shall be incorporated in a harness.

The system consists of anchorage, one or two short lanyards and body support, with usually a full-body harness and another system as backup. The system will be rigged so that a person cannot free fall more than 2 feet. The system will be attached to an anchorage capable of supporting 3,000 pounds, or twice the potential impact load of the worker, whichever is greater.

Note: The positioning system (if used alone) is not considered Fall Protection. A positioning system will not be used as a primary Fall Protection system. A positioning system will require an additional, separate system used as backup to protect the person from falling.

Restraint System

A restraint system can be used on horizontal or mildly sloped surfaces between 0 and 18.4 degrees (up to 4 vertical into 12 horizontal). The system consists of a safety harness (full-body harness) attached to securely rigged restraint lines.

The restraint system will be rigged to allow the movement of employees only so far as the sides and edges of the walking-working surfaces. The person will not be exposed to a fall hazard. Fall arresters and self-retracting lanyards are prohibited for use as part of a restraint system or in horizontal applications, unless permitted for such use by the manufacturer.

A lanyard with energy absorbers may be used in a restraint system, provided the engineer who is a Qualified Person has

determined whether or not the restraint force could cause the personal energy absorber to deploy, and if so, that such deployment will not permit the worker to reach the fall hazard.

When using a flexible anchorage system such as a horizontal lifeline system as part of a restraint system, pay special attention to how short the lanyard or lifeline needs to be so that the worker will not reach a fall hazard condition.

Other Fall Protection Systems

Safety Nets – Safety nets are installed as close as practical below the leading edge for employee protection or when working over water, on bridges or high-rise buildings or structures. The minimum breaking strength of border rope or webbing will be 5,000 pounds. The mesh opening will not be larger than 36 square inches or longer than 6 inches on any side. In any case, the net will be installed not lower than 30 feet from the working surface (DON requirement is 25 feet).

Horizontal Lifeline System – A horizontal lifeline is a fall arrest system consisting of a flexible rope, wire or synthetic cable that is installed on a horizontal plane (or minimally sloped up to 5%) between two end anchorages and used for attachment of a worker's lanyard or lifeline device. A horizontal lifeline is used to control dangerous pendulum-like swing falls. (Note: Horizontal lifeline system will deflect 4 feet or more under load.) A Qualified Person for Fall Protection must design the system.

Single Anchor Vertical Lifeline System – A single anchor vertical lifeline is a vertically suspended line attached to a 5,000-pound fixed overhead anchorage independent of the walking-working surface to which a lanyard or device is attached. When single anchor vertical lifelines are used, each employee will be attached to a separate lifeline. There will not be more than one worker attached to a vertical lifeline. Each worker requires his/her independent vertical lifeline.

Suspended Rope Access – Requirements:

- Two independent anchorages
- Two lifelines or ropes attached to the anchorages, a working line and a backup safety line. Each one is to be independently anchored.

- Ropes should be of low-stretch Kernmantle and arranged so that any abrasion will be avoided.
- Use full-body harness.

Climbing-Ladder Fall Arrest System (Ladder Climbing Device System) – A climbing-ladder fall arrest system is installed on fixed ladders over 20 feet in length. The 20 feet is the length of the climb. It is made of rigid rail, cable or rope. Anchorage strength requirement is 3,000 pounds. Free-fall distance will not exceed 2 feet.

Warning Line System – A warning line system used during construction work is a barrier erected on a walking and working surface or a low-pitched roof having a slope less than or equal to 4 in 12 (vertical to horizontal), or less than 18.4 degrees, to warn workers that they are approaching a fall hazard. A warning line system must be erected around all sides of the work area during construction work. Where mechanical equipment is not being used, the warning line will be erected not less than 6 feet from the edge of the roof. When mechanical equipment is being used, the warning line will be erected not less than 6 feet from the roof edge parallel to the direction of mechanical equipment operation. The warning line will be not less than 10 feet from the roof edge perpendicular to the direction of mechanical equipment operation.

Designated Area Method – Designated Area Method is a system used during general industry work on flat or minimum sloped roofs for conducting inspection of mechanical equipment (other than roof inspections) or conducting other general industry work (e.g., HVAC repairs). The requirements for Designated Area Method are identical to the warning line system. In addition to the requirements of the warning line system, a 100% transition is required from the access point to the designated area.

Safety Monitoring System (Competent Person) – The safety monitoring system shall not be used as a Fall Protection method.

Controlled Access Zone – Controlled Access Zone shall not be used as a Fall Protection system.

Tie-Off Considerations and Selection of Safe Anchorages

One of the most important aspects of personal fall arrest is fully planning the system before it is put in use. Probably the most overlooked component of the fall arrest system is planning for suitable anchorages. Such planning should ideally be done during the design stage and before a structure or a building is constructed so that anchorages can be incorporated and identified during construction for maximum use later for maintenance work. If needed, properly planned and designed, these anchorages used during construction work may also be used afterward during maintenance.

The strength of a personal fall arrest system depends on its subsystems and components, as well as the anchorages and how strongly such a system is attached to the anchorage. Such attachment will not significantly reduce the strength of the system, including the structural members (e.g., the beams or columns to which it is attached). If a method of attachment is used that will reduce the strength of the system, such component (e.g., beam or column) will be replaced with a stronger one in order to maintain the appropriate maximum characteristics in compliance with IBC and design criteria documents.

The anchorage location should be as high as possible to minimize the free-fall distance and prevent any contact with an obstruction or the ground below if a worker falls. Free-fall distance will not exceed 6 feet unless a specially designed lanyard is used that will allow the 12-foot free fall, provided the maximum arresting force does not exceed 1,800 pounds. The anchorage point height will reflect this restriction.

Tie-off point(s) will be located in such a way to minimize the swinging of the worker (pendulum-like motion) that can occur during a fall. The farther away in a horizontal direction a worker moves from a fixed anchorage (tie-off point), the greater the swing angle if a fall occurs. If any obstruction exists in the path of the swing fall, the force generated can be significant. The maximum angle of swing away from the tie-off point should not be more than 15 degrees in either direction.

Fall Protection for Specific Work Applications

Fall Protection Requirements When Conducting Roof Inspection Investigation and Assessment Work

- FP is required when conducting inspection, investigation or assessment work within 6 feet (1.8 m) of an unprotected edge of a roof, before start of construction or after construction work is complete.
- FP may not be required when conducting inspection, investigation or assessment work more than 6 feet (1.8 m) away from an unprotected edge of a roof, before start of construction or after construction work is complete.
- FP is required when conducting inspection and investigation work during maintenance evolutions (i.e., inspecting or maintaining HVAC or other equipment on roofs).
- FP is required for employees exposed to fall hazards while conducting inspection, investigation or assessment work DURING construction activities.

Safe Work Practices

- Do not access or work on a roof unless trained appropriately.
- Review the Fall Hazard Survey Report for the roof to ensure that a proper risk assessment has been completed before accessing and/or commencing any work on roofs.
- Ensure that an additional roof risk assessment has been completed when accessing and working on a roof during adverse weather conditions (e.g., wind, rain, excessive heat, etc.).
- Ensure that the following personal protective equipment (PPE) be worn at all times: roof shoes, sunscreen, sunglasses.
- Ensure that Public Works personnel and the Command Safety Office are aware of personnel presence/work on the roof and the expected timeframe.
- Do not work on a roof alone – always work in pairs.

- Ensure that a form of communication link is established with the Safety Office.
- Roof areas should be tidy and clean; where rubbish or stacked material interferes with ascending and performing inspection work of the roof, do not proceed until it is safe to perform the work.
- Ensure that there is a safe method of access to the roof and that this method is used. Ensure that all ladders are safe and any erected scaffolding is certified and safe.
- Ensure that there is a safe method of transporting any needed equipment to the roof work area.
- Make sure of the structural soundness of the roof and frame before a person walks on a roof.
- Be familiar with the Emergency Rescue Response Procedure and the Command fall hazard rescue plan.

Additional Protective Measures:

- All inspectors shall wear proper clothing. Hard hats shall be worn at the site for all roofing construction projects and OSHA roof construction safety requirements shall be followed.
- Check ladders before use to ensure they are safe, in good working order, extend at least 3 rungs above the roof edge, are properly secured and are installed at proper slope.
- Drinking alcoholic beverages on the job, reporting to work intoxicated or being under the influence of drugs is strictly forbidden and not allowed on any construction site.
- During hot weather, be particularly aware of heat exhaustion and heat stroke symptoms. Employees should drink water frequently and get out of the sun if they become dizzy. During cold weather, be aware of hypothermia and frostbite symptoms. Employees should dress warmly (in layers), warm up frequently and stay dry.

Scaffold Work

Use guardrails, cross bracing or full-body harness and lifelines. During erection and dismantling operations, it is highly recommended to have a Fall Protection system. During erection and dismantling of scaffolds, an evaluation will be conducted by the Competent Person to determine the feasibility and safety of providing Fall Protection. On supported scaffolds over 20 feet high, use stairs instead of ladders to access the scaffold.

Suspended Scaffolds Including Single and Two-Point Suspended Scaffolds

- In addition to a railing, use an independent single anchor vertical lifeline connected to a full-body harness for every worker in suspended scaffolds.
- Full-body harness is to be connected to the fall arrester (rope grab) on the single vertical lifeline with a lanyard no longer than 3 feet.
- The rope of the vertical lifeline will be of the material and diameter compatible with requirements as marked on the fall arrester.
- The suspended scaffold will be maintained in accordance with manufacturer's instructions and specifications.

Aerial Work Platforms

Applicable Equipment:

- Vehicle-Mounted Rotating and Elevating Aerial Devices
- Boom-Supported Elevating Work Platforms
- Self-Propelled Elevating Work Platforms/Scissor Lifts
- Manually Propelled Elevating Work Platforms

Note: Platform means a portion of the Aerial Work Platform (AWP) such as a bucket, basket, stand or equivalent that is designed to be occupied by personnel.

Aerial Lifting Equipment

- Aerial Lifting Equipment including **Vehicle-Mounted Rotating and Elevating Aerial Devices** (ANSI A92.2 equipment) and **Boom-Supported Elevating Work Platforms** (ANSI A92.5 equipment) usually have either a platform surrounded by guardrails (e.g., JLG) or a basket (i.e., "cherry picker") used to raise and lower employees.

- Aerial lifting equipment that has a boom (articulating or non-articulating) sometimes is subject to "hanging up" on a protruding object while being raised, and jolting the man-platform or basket when releasing from the caught projection. This upward jolt can propel (eject) an employee from the man-platform or man-basket. Employees in an aerial lift must be connected with a restraint system. Occupants always will stand firmly on the floor of the basket, and will not sit or climb on the edge of the basket or use planks, ladders or other devices for a work positioning.
- Occupants in aerial lifts will always be tied off using a restraint system to protect an employee from being ejected from the man-platform or man-basket. It is important that the restraint system keep the employee from being ejected over the guardrail or out of the basket. If an employee were to be ejected over the guardrail, the resulting momentum force could be sufficient to tip over the aerial lift, if the boom were raised high enough and the resulting momentum forces were great enough. The best connecting device option is an adjustable energy-absorbing lanyard.

- Always use a full-body harness in a restraint system. Aerial lifts often have designed anchorages at the platform level, knee level or waist level. Depending on the level of the anchorage point and the tie-off point on the full-body harness (at the dorsal D-ring), the lanyard selected must be short enough to prevent ejection from the man-platform or man-basket.
- Before elevating the work platform of a boom-supported articulating lift, the operator will verify that all occupants' full-body harnesses are on, and donned properly.
- The use of self-retracting devices is not permitted in aerial lifts.

Scissor Lifts

- **Self-Propelled Elevating Work Platforms/Scissor Lifts** (ANSI A92.6 equipment) 4 feet or higher will be equipped with standard guardrails. In addition to the guardrail provided, the equipment will be equipped with anchorages meeting ANSI Z359 Fall Protection Code/Standards. Scissor lifts are considered scaffolds.
- A restraint system will be used in addition to guardrails. Lanyards used with the restraint system will be sufficiently short to prohibit workers from climbing out of, or being ejected from, the platform. It is highly recommended to use adjustable energy-absorbing lanyards. Scissor lifts equipped with anchorages that do not meet ANSI Z359 Fall Protection Code/Standards will not be used or will be removed from service. Should the worker's feet leave the floor of the platform of the elevated scissor lift, or the worker is required to exit the lift at height, continuous Fall Protection must be provided. The worker must be connected to an anchorage point outside of the scissor lift or mobile scaffold before opening the swing gate and stepping out of the work platform. The worker must not be simultaneously connected to the work platform and to an anchorage point outside of the work platform, in case the scissor lift were to travel.

Mobile Scaffolds

- **Manually Propelled Elevating Work Platforms** (per ANSI/SIA A92.3): The platform of the mobile scaffolds will be equipped with a standard guardrail. In addition to the guardrail provided, if the platform is equipped with manufactured anchorages meeting ANSI Z359 Fall Protection Code, a restraint system will be used in addition to the guardrails. Lanyards used with the restraint system will be sufficiently short to prohibit workers from climbing out of, or being ejected from, the platform. Lanyards with built-in shock absorbers are acceptable. The use of a self-retracting device is not acceptable.
- The platform will not be occupied when moved and at no time will workers be allowed to climb on or over the guardrails. In case the wheels of the mobile scaffold are chocked and brakes locked, then the workers should be connected to a "restraint system." The purpose of a restraint system is to prevent the worker from being ejected over the guardrail if the mobile scaffold were to hit a pothole or experience a sudden change in elevation while moving.

Confined Space Entry

In a confined space, if there should be a hazard of exposure to vertical fall, before entering such a space, the person entering will be tied to a lifeline, SRL and rescue and retrieval equipment. A co-worker, who is able to retrieve the victim by utilizing the retrieval mechanism from outside the confined space without difficulty, must be present. Refer to 29 CFR 1910.146 for additional information on confined space entry.

Excavated Trenches or Holes Deeper Than 6 Feet

Provide temporary guardrails on both sides of the trench or around holes, or establish a warning line system. Any person crossing this line or guardrails is required to have Fall Protection. Additional requirements can be found in USACE EM 385-1-1, Section 25.

Aircraft Maintenance and Inspection Work

Falls from aircraft are potential sources of injuries and fatalities to aircraft maintenance personnel, aircrew and inspectors. Commands performing aviation maintenance are required to perform risk management (RM) or operational risk management (ORM) to identify, assess, determine and implement controls to mitigate hazards during aircraft maintenance evolutions, inspections and other related work.

Special consideration must be given to the use of Fall Protection equipment and systems on active flight lines due to the risk of foreign object damage (FOD) and the potential effects of rotor, jet or propeller wash. If maintenance or inspection work is required on the flight line, consideration should be given to utilizing a designated maintenance area that is free from the additional hazards that may be caused by propeller, jet or rotor wash. Where these hazards cannot be controlled effectively, then administrative controls may provide the best Fall Protection methods on active flight lines. In this case, personnel will use risk management and other administrative controls to mitigate fall hazards.

If the Competent Person for Fall Protection determines that the use of Fall Protection equipment is not feasible or practicable based on the overall hazard analysis/JSA, personnel shall use risk management and other administrative controls to mitigate fall hazards in accordance with the guidance of the Competent Person for Fall Protection.

Maintenance and Inspection Work:

- Personnel will be trained to recognize the hazards of falling, fall risks at the work site, recognition of fall hazard deficiencies and safe use of the equipment they are operating on, including integrated features such as steps and hold points and the selection and safe use of Fall Protection equipment.
- Designated walkways will be identified and used wherever possible. Walkways are pre-identified paths that a person is permitted or allowed to walk on without the use of Fall Protection equipment (if Fall Protection is not available).
- Personnel working on aircraft surfaces should wear slip-resistant soled shoes and other appropriate PPE.
- Good housekeeping practice is paramount, and will be enforced or implemented. Clean all aircraft surfaces immediately when hydraulic fluids, oils and other fluids contaminate the work site.
- Winds or other environmental variables such as rain, snow, frost or ice that may preclude the safe performance of maintenance or inspection work will be considered in the RM or ORM.
- Where the use of Fall Protection equipment is not feasible (e.g., active flight line, preflight inspections), Commands will utilize RM or ORM, at a minimum, to analyze and determine alternate methods (administrative controls) to mitigate risk.

Cleaning, Washing or De-icing Aircraft:

- To protect against falls while cleaning, washing or de-icing aircraft, personnel should not be allowed to climb or walk on wet, frost-covered or icy surfaces.
- For washing or cleaning aircraft, separate elevated work platforms or work stands and long-handle brushes will be used to the maximum extent possible. This does not preclude the additional use of other Fall Protection systems.
- Where it is necessary to walk on aircraft wings or other surfaces during washing, extreme care will be exercised and other control measures, as appropriate, will be utilized, such as horizontal lifelines or self-retracting lanyards (SRLs), to which a full-body harness can be attached.

Elevated Work Area Near Guardrails

Wherever an employee climbs above the flooring (e.g., climbs a step ladder placed on a platform) of a lift, catwalk, platform, scaffold, elevated work platform or stairway above 4 feet, or works on stilts, thereby reducing the height of the top-rail in relation to the employee to less than 42 inches (+/- 3 inches), the height of the guardrail must be raised accordingly to maintain a protective height of 42 inches above the stilt or raised platform/work-stand height. If this is not possible, use another Fall Protection system.

Ladders and Stairs

Portable and Extension Ladders (Non-Self-Supporting):

Personnel risk falling if portable ladders are not safely positioned each time they are used. While personnel are on a ladder, it may move and slip from its supports. Personnel can also lose their balance while getting on or off an unsteady ladder.

- The ladder will be placed so as to prevent slipping or will be lashed or held in position (tied).
- An employee may perform work from a non-self-supporting portable ladder placed at the correct angle and properly secured (e.g., lashed top and bottom) if the employee is facing the ladder and his or her body is between the side rails, and he/she uses one hand to grasp the ladder with both feet on the ladder rungs.

Fixed Ladders:

- An employee will not perform work from a fixed ladder unless he/she is wearing Fall Protection, such as a full-body harness attached to a climbing-ladder fall arrest system or self-retracting device, which in turn is attached to a properly designed and installed anchorage.
- If light work is performed from a ladder, use one hand for gripping stability on a rung and the other hand for performing light duty work and by maintaining three points of contact at all times (two feet, one hand, or two hands and one foot). When climbing the ladder, maintain a three-point control by holding on to the horizontal rungs with both hands instead of holding on to the vertical side rails.

- All climbing-ladder fall arrest systems will use an automatic fall arrester, permitting the worker to ascend or descend without continually having to hold, push or pull any part of the device, leaving both hands free for climbing. These climbing-ladder fall arrest systems must be activated within 2 feet after fall initiation.
- The side rails of the ladder extensions must extend 42 inches above the top level or landing platform or working surface served by the ladder, and must afford a "power grip" (hand must be able to encircle or almost encircle the side rail).
- Ladder safety devices, cages or wells are required on all fixed ladders more than 20 feet. (Note: DON requires fixed ladders over 20 feet to be equipped with either a climbing-ladder fall arrest system or a self-retracting device.)

Work Over Water

Employees working 4 feet or more above water or liquids must be protected from falling by providing Fall Protection (e.g., guardrails, fall arrest equipment, etc.). Additionally, employees working over or near water, where the danger of drowning exists, also shall wear U.S. Coast Guard-approved lifejackets or buoyant work vests. At least one lifesaving skiff with an available operator will be present at locations where employees are working over, near or adjacent to water that they might fall into. Ring buoys and a skiff must be provided, irrespective of the Fall Protection provided. Ring buoys and skiffs address the hazard of falls that may occur in the event of a lapse in use of fall arrest equipment. Where work over water is performed, a "Man Overboard" plan will be prepared and used.

Inspection, Storage, Care and Maintenance for Fall Protection Equipment

Personal fall arrest systems must be regularly inspected. Any component of the system with significant defects must be removed from service immediately and will be tagged or marked as unusable or destroyed. All Fall Protection equipment shall be inspected before each use by the end user/authorized person and by a Competent Person at intervals of no more than one year, or as prescribed by the manufacturer of the equipment. All components and subcomponents of the selected fall arrest, positioning and restraint systems will be compatible.

As a general rule, always consult equipment manufacturers' instructions and recommendations for use, inspection, care and maintenance procedures.

Inspection

Inspect personal Fall Protection equipment for the following defects:

- **Webbing and Ropes (harnesses, lanyards, straps, etc.)**: Look for cuts, wear, tears, damaged threads, broken fibers, undue stretching, torn or pulled stitches, frayed edges, mold, alterations or additions that will affect its efficiency, damage due to deterioration, chemical damage (contact with fire, acids or corrosives), abrasions, ultraviolet deterioration, missing markings and labels and any wearing or internal deterioration of the ropes.
- **Hardware (snaphooks, carabiners, connectors and D-rings)**: Look for distorted hooks or faulty springs, tongues unfitted to the shoulder buckles, loose or damaged mountings and nonfunctional parts. Check for signs of excessive wear, crack, corrosion and deformation.

Inspection Frequency for Self-Retracting Devices

Type of Use	Application	Condition of Use	Inspection Frequency by Competent Person	Factory Authorized Inspection
Infrequent or minimal usage	Used in rescue, confined space, industrial maintenance	Good indoor storage or minimal outdoor use	Semi-annually	At least every 2-5 years
Moderate to heavy use	Transportation, Construction, Utilities and Warehouses	Moderate storage conditions, indoor and extended outdoor usage, all temperatures or dusty environment	Semi-annually	At least every 1-2 years
Continuous usage to severe conditions	Heavy construction and industrial use, shipyard environment	Harsh storage conditions, continuous outdoor use, all temperatures, dirty environment	Quarterly to semi-annually	At least annually

Care and Maintenance of the Equipment

Snaphooks and Carabiners: Clean dirty gates of snaphooks and carabiners by applying WD-40 (or equivalent), other solvents, oil or kerosene until the gates work smoothly, then immerse in boiling water for 20–30 seconds to remove cleaning agent; dry with a soft cloth to ensure that the gate and gatekeeper operate properly.

Harnesses, Lanyards and Ropes: Wash on a regular basis with mild soap and rinse multiple times to remove the soap residue, store in a cool, dry and safe environment to dry. Ensure harnesses and lanyards are not painted or marked. Mark only on labels.

Note: Always consult manufacturer's instructions and recommendations for care and maintenance of the equipment.

Fall Arrest Rescue

Fall Rescue Requirements

A person working at heights using Fall Protection equipment may require rescue if he or she falls and is suspended in a harness. Prompt rescue is very important. Studies show that a person suspended in a harness may have blood circulation problems within a few minutes. Accordingly, a site-specific Rescue Plan must be prepared in writing and maintained for all instances where personnel work at heights and are exposed to fall hazards.

Fall Arrest Rescue Plan

The Rescue Plan will be written and contain detailed procedures on the methods of rescue, methods of self-rescue, equipment used, training requirements, specialized training for rescuer(s), procedures for requesting rescue and available medical assistance. Where the rescue may not be, or cannot be, solely performed by a jurisdictional public (e.g., city fire department) and/or government emergency-response agency (e.g., government fire department), then the Rescue Plan must contain detailed procedures for planned rescue methods.

The end user using Fall Protection equipment will have an assigned safety person (spotter), which is also known as the "buddy system," who is within visual and aural range of the end user. The duty of the assigned safety person is to check periodically (at least every 5 minutes) to assure that the end user has not fallen and become suspended in the harness. The assigned safety person will have the capability to make quick contact with the jurisdictional public or government emergency-response agency; or the end user (or the team leader of a group of end users) will have this capability, in the case of the end user or team visiting another Service.

Fall Arrest Methods of Rescue

- Jurisdictional Public Emergency-Response Agency
- Government Emergency-Response Agency
- Assisted Rescue: The written Rescue Plan shall include instructions for contacting rescue personnel, plus a description and verified location of all equipment to be used by the rescue team (e.g., scissor lift or aerial lift), and complete instructions and procedures for performing rescue safely and promptly.
- Self-rescue: An end user who has fallen and is suspended in a full-body harness and not incapacitated (e.g., an injury, stroke or heart attack) can usually perform a self-rescue, where the following conditions exist:
  - ◊ The end user can reach an adjoining structure and has the strength and mobility to pull up and onto the structure.
  - ◊ The end user has a self-deploying or manual-deploying coiled webbing rescue ladder attached to a lanyard anchorage, which after a fall allows climbing up to the anchorage point (or at least simply standing in the ladder, allowing the necessary circulation of blood to the entire body while an assisted rescue is being commenced).
  - ◊ An automatic or manual controlled descent device can be used as a self-rescue device if it is attached to a separate anchorage point (minimum 3,000-pound strength) and a vertical tag-line is attached to the controlled descent device's safety snaphook that can be reached by the employee suspended in the full-body harness.

Resources

How to Obtain Information

- OSHA Regulations/Standards from OSHA Web Page – www.osha.gov
- US Army – http://armypubs.army.mil
- Department of Navy – www.navycs.com/navypublicationinstruction.html
- US Air Force – www.e-publishing.af.mil
- US Marine Corps – http://guides.grc.usmcu.edu/content.php?pid=234141&sid=1938041
- US Army Corps of Engineers – www.usace.army.mil

Applicable Instructions and Standards

- Air Force Instruction (AFI) 91-203, Air Force Consolidated Occupational Safety Instruction; Chapter 13 – Fall Protection General Operations & Chapter 24 – Aircraft FP Requirements
- OPNAVINST. 5100.23 Series, DON Safety and Occupational Health Program Manual; Chapter 12, Fall Protection Program
- US Army Corps of Engineers (USACE), EM 385-1-1, Safety and Health Requirements Manual
- NAVMC DIR 5100.8, Marine Corps Occupational Safety and Health (OSH) Program Manual
- MCO 5100.29B, Marine Corps Safety Program
- Department of Defense Directive 6055.1, Occupational Safety and Health Program
- American National Standards Institute (ANSI)/ASSE Z359 Fall Protection Code/Standards
- OSHA 29 CFR, PART 1926.500, Subpart M, Fall Protection Requirements in the Construction Industry
- OSHA 29 CFR, PART 1910, Occupational Safety and Health Standards
- OSHA 29 CFR PART 1960, Basic Program Elements for Federal Employee Occupational Safety and Health Programs
- Completed and Published ANSI Z359 Fall Protection Standards

Fall Protection Field Guide

Falls from heights are a leading cause of work-related injuries and fatalities. They are the leading cause in construction and the fourth most common cause in general industry.

While the military services enjoy an excellent safety record, fall-related mishaps and their associated hazards are still a serious concern. However, falls are preventable. Careful planning and preparation lay the necessary groundwork for an accident-free workplace.

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