Chapter 45: Fall Protection

Quick Start Summary

1 Who needs to know about these requirements

The requirements of Fall Protection apply to workers/authorized persons, competent and qualified persons and qualified engineers, supervisors/line management, the chief safety officer, the Department of Energy (DOE) site manager, and the fall protection program manager.

2 Why

Unprotected falls from elevation usually result in serious debilitating injury or death. Falls can be prevented through the use of proper prevention and arrest systems.

3 What do I need to know

Work in unprotected elevated work areas (defined as any elevated work surface, including roofs, not surrounded by a passive fixed barrier such as conforming guardrails or protective parapet), requires

- Workers to be authorized persons, trained in fall protection
- Working in teams of two or more
- Identification of hazards and controls, documented in an elevated surface work plan, developed by an authorized or competent person and approved by a competent person, relying on conventional fall protection measures (guardrails, fall restraint or arrest equipment, safety nets). When conventional fall protection measures are impractical or create a greater hazard, a fall protection plan must be developed instead, which must be written by a qualified person and approved in writing by the SLAC chief safety officer and the Department of Energy (DOE) site manager or designee.
- Use of properly designed, marked, and maintained fall protection equipment

4 When

The requirements of this chapter take effect 24 June 2022.

5 Where do I find more information

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)
- Chapter 45, “Fall Protection”

Or contact the program manager.
1 Purpose

The purpose of this program is to prevent unprotected falls through the use proper of prevention and arrest systems. It covers working in unprotected elevated work areas (defined as any elevated work surface, including roofs, not surrounded by a passive fixed barrier such as conforming guardrails or protective parapet), use and design of fall protection systems, and designation of personnel. It applies to workers/authorized persons, competent and qualified persons and qualified engineers, supervisors/line management, the chief safety officer, the Department of Energy (DOE) site manager, and the fall protection program manager.

The requirements of this program do not apply to scaffold erection, articulating boom type aerial lifts, scissors lifts, excavations, motor vehicles, or personnel hoists, or work performed from ladders.

2 Roles and Responsibilities

Functional roles and general responsibilities for each are listed below. More detailed responsibilities and when they apply are provided in the procedures and requirements.

The roles may be performed by one or more individuals and one individual may play more than one role, depending on the structure of the organizations involved. Responsibilities may be delegated.

2.1 Worker / Authorized Person

- Completes required training to work in unprotected elevated work areas and use fall protection equipment
- Observes fall protection rules while working at elevations
- Wears fall arrest or restraint equipment properly while working at unprotected elevations
- Works in teams of two or more (two-person rule) whenever using fall restraint or fall arrest systems or control lines
- Develops an elevated surface work plan before accessing unprotected elevations
- Ties off only to rated and approved anchorage points
- Reports to supervisor any frequently accessed work platforms, including roofs, that are not protected by guardrails or a cable system
2.2 Competent Person

- Is determined by training, knowledge, and experience with personnel performing work at heights
- For SLAC, is designated by the fall protection program manager in consultation with line management. For subcontracted construction work, is designated by the subcontractor.
- Trains authorized persons in recognizing fall hazards, safe use of equipment, and pre-use inspections
- Performs required fall protection equipment inspections and maintaining records
- Approves elevated surface work plans. For subcontracted construction work, a SLAC competent person accepts the plan prepared and approved by the subcontractor competent person.
- Implements approved fall protection plans

2.3 Qualified Person

- Is determined by training, knowledge, and experience with personnel performing work at heights
- Is designated by the fall protection program manager in consultation with line management
- Develops fall protection plans

2.4 Qualified Engineer

- Is a structural or civil engineer who has completed additional training as determined by the fall protection program manager
- Is designated by the fall protection program manager in consultation with line management
- Designs and supervises the installation and designation of fall protection anchorages and systems
- Performs the required fall protection equipment and anchorages inspections if needed

2.5 Supervisor / Line Management

- Ensures work in unprotected elevated work areas is done only by authorized persons, using an elevated surface work plan or fall protection plan
- Ensures that everyone who uses a permanently installed fall protection system has been trained on the proper use of and access to that system. Line management is also responsible for developing, documenting, and ensuring the effectiveness of this controlled access.
- Ensures the completion of inspections and required documentation
- Approves designation by the fall protection program manager of competent and qualified persons and qualified engineers

2.6 Chief Safety Officer

- Approves in writing fall protection plans
2.7 Department of Energy Site Manager (or Designee)
   - Approves in writing use of fall protection plans

2.8 Fall Protection Program Manager
   - Designates competent and qualified persons and qualified engineers in consultation with line management
   - Maintains fall protection designations in the Competent and Qualified Persons and Engineers list

3 Procedures, Processes, and Requirements

These documents list the core requirements for this program and describe how to implement them:
   - **Fall Protection: Fall Protection Requirements** (SLAC-I-730-0A21S-055). Describes requirements for working in unprotected elevated work areas, use and design of fall protection systems, and designation of personnel
   - **Fall Protection: Fall Protection Plan Requirements** (SLAC-I-730-0A21S-054). Describes required elements and approvals for fall protection plans

These documents provide useful guidance; their use is not mandatory:
   - None

4 Training

4.1 Worker / Authorized Person

Only designated, authorized persons may participate in fall protection activities.

The minimum course requirement for workers who only access linac housing manway ladders or only use ladders with an attached ladder climbing device is the following, which must be completed initially and every 36 months:
   - ESH Course 203, LINAC Access Ladders and Ladder Climbing Devices (ESH Course 203) (every 36 months)

*Note* ESH Course 203 is a prerequisite for ESH Course 200.

All other workers who must wear and use fall protection equipment or must access unprotected elevated work surfaces as part of their jobs must complete the following course initially and every 36 months:
   - ESH Course 200, Fall Protection / Authorized Training (ESH Course 200) (every 36 months)

4.2 Competent or Qualified Person or Qualified Engineer

   - ESH Course 202, Fall Protection / Competent Training (ESH Course 202)
Competent and qualified person or engineer training is offered through private firms that specialize in fall protection engineering and applications. The program manager will assist in recommending training courses.

5 Definitions

**anchorage point.** A secure point of attachment for lifelines, lanyards, or deceleration devices

**controlled access zone (CAZ).** An area in which certain work may take place without the use of guardrails, personal fall arrest systems, or safety nets and access to the zone is controlled

**elevated work surface.** Roof surfaces within six feet of edge and work platforms more than six feet above a lower level (for construction work) or four feet (for general industry work)

**free fall.** The portion of a fall before a personal fall arrest system begins to apply force to arrest the fall

**frequent access, any other elevated work platforms or areas that are not roofs.** More than 12 times per year

**frequent access, roofs.** More than four times per year

**person, authorized.** A person at SLAC who has completed required training and is authorized to wear and use fall protection equipment and so work at unprotected elevations

**person, competent.** 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.¹ A designated SLAC fall protection competent person has completed required training and has appropriate experience.

**person, qualified.** One who by reason of training, experience, or instruction has demonstrated the ability to safely perform all assigned duties relating to work at or on elevated surfaces, unprotected or protected (see engineer, qualified)

**plan, elevated surface work.** A document that examines and addresses fall hazards associated with a particular job on an unprotected elevated work platform or area. Incorporates elements of a rescue plan if fall arrest systems are in use.

**plan, fall protection.** A written document that describes the job task and procedures to eliminate or control elevated fall hazards foreseeably encountered in the work when conventional fall protection measures (guardrails, fall arrest equipment) are not feasible

**plan, rescue.** A strategy or procedure, planned in advance and practiced by designated rescue personnel, to retrieve safely a person who has fallen from an elevated work surface and who remains suspended in a full body harness, unable to perform self-rescue

**protective parapet.** A parapet surrounding the edge of a roof at least 24 inches high for roofing work, and at least 42 inches for all other construction and general industry work

**qualified engineer.** A qualified person who is in addition licensed in accordance with federal, state, or local laws and regulations (see also person, qualified)

**roof.** A walking or working surface whose primary function is to provide weather protection on a building, C-train, modular trailer, rigid canopy, switch gear, transformer

**roof, low-slope.** A roof with a maximum slope of four vertical to 12 horizontal

**two-person rule.** Rule that people must work in teams of two or more in defined situations

**system, fall arrest.** A system used to arrest a person in a fall from a working level and that minimizes the potential for compounding injury. It consists of an anchorage, connectors, and a body harness and may include a lanyard, deceleration device, or lifeline.

**system, fall restraint.** An approved device and any necessary components that function together to restrain an employee in such a manner as to prevent that employee from falling to a lower level

**system, lifeline, horizontal.** An engineered rail, rope, wire, or synthetic cable installed horizontally and used for attachment of a worker’s lanyard or lifeline device while moving horizontally

**transit from a ladder.** The action of a person climbing off of or onto a ladder, usually at the edge of a roof

**suspension trauma.** The rapid onset of adverse physical symptoms to a person hanging in a full body harness (after approximately 15 minutes) such as light-headedness, palpitations, tremulousness, fatigue, nausea, dizziness, headache, sweating, weakness, loss of consciousness and even death, caused by venous pooling and oxygen deprivation to the brain, kidneys, and other organs.

**unprotected elevated work platform or area.** Any elevated work surface, including roofs, not surrounded by a passive fixed barrier such as conforming guardrails or protective parapet

**work, construction.** Any activity involving the construction, alteration, painting, repairing, construction maintenance, renovation, removal, or wrecking of any fixed structure or its parts. This includes roofing work.

**work, general industry.** Activities such as equipment maintenance, calibrations, inspections, plumbing repair, running electrical cabling. Does not include construction activities.

**work, on roofs (either construction or maintenance/general industry related).** Any work done on a roof that is unrelated to the roof surface itself, such as HVAC maintenance, equipment calibrations, new equipment installation. Does not include roofing work.

**work, roofing.** Activities involving the application or removal of roofing materials such as asphalt or coal-tar pitch, sheet metal, wood shakes, clay tile, concrete tile, slate or like materials. Roofing work includes patching and repairing.
6 References

6.1 External Requirements

The following are the external requirements that apply to this program:


  - Section 3209, “Standard Guardrails” (8 CCR 3209)
  - Section 3210, “Guardrails at Elevated Locations” (8 CCR 3210)
  - Section 3212, “Floor Openings, Floor Holes, Skylights and Roofs” (8 CCR 3212)


- The following industry-accepted consensus standards:
  - American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) A10.32, “Personal Fall Protection Used in Construction and Demolition Operations” (ANSI/ASSE A10.32)
  - American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.0, “Definitions and Nomenclature Used for Fall Protection and Fall Arrest” (ANSI/ASSE Z359.0)
  - American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.1, “The Fall Protection Code” (ANSI/ASSE Z359.1)
  - American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.2, “Minimum Requirements for a Comprehensive Managed Fall Protection Program” (ANSI/ASSE Z359.2)
  - American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.4, “Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components” (ANSI/ASSE Z359.4)
American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.6, “Specifications and Design Requirements for Active Fall Protection Systems” (ANSI/ASSE Z359.6)


American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.11, “Safety Requirements for Full Body Harnesses” (ANSI/ASSE Z359.11)

American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.12, “Connecting Components for Personal Fall Arrest Systems” (ANSI/ASSE Z359.12)

American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.13, “Personal Energy Absorbers and Energy Absorbing Lanyards” (ANSI/ASSE Z359.13)

American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.14, “Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems” (ANSI/ASSE Z359.14)

American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.15, “Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest and Rescue Systems” (ANSI/ASSE Z359.15)

American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.16, “Safety Requirements for Climbing Ladder Fall Arrest Systems” (ANSI/ASSE Z359.16)

American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.18, “Safety Requirements for Anchorage Connectors for Active Fall Protection Systems - Part of the Fall Protection Code” (ANSI/ASSE Z359.18)

6.2 Related Documents

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 2, “Work Planning and Control”
- Chapter 15, “Ladder and Scaffold Safety”
- Chapter 47, “Mobile Elevating Work Platforms”

Other SLAC Documents

- Competent and Qualified Persons and Engineers

Other Documents


Chapter 45: Fall Protection

Fall Protection Requirements

1 Purpose

The purpose of these requirements is to prevent unprotected falls through the proper use of fall prevention and arrest systems. It covers working in unprotected elevated work areas (defined as any elevated work surface, including roofs, not surrounded by a passive fixed barrier such as conforming guardrails or protective parapet), use and design of fall protection systems, and designation of personnel. It applies to workers/authorized persons, competent and qualified persons and qualified engineers, supervisors/line management, the chief safety officer, the Department of Energy (DOE) site manager, and the fall protection program manager.

2 Requirements

2.1 Preferred Controls

The following engineered controls are the preferred means of preventing falls:

- **On roofs.** Engineered guardrails designed in accordance with applicable standards or 42-inch height minimum parapets are required at roof edges when frequent access is required (more than four times per year).

- **On other elevated work surfaces.** Engineered guardrails designed in accordance with applicable standards are required on elevated fixed platforms, mezzanines, catwalks, and balconies when frequent access is required (more than 12 times per year).

For infrequent access to these locations or if guardrails are infeasible, fall protection equipment, such as harnesses, lanyards, and anchorage points, may be used in conjunction with formal authorization as described below.

2.2 Accessing Unprotected Elevated Work Areas

2.2.1 Authorization

Work in unprotected elevated work areas requires workers to be authorized persons, trained in fall protection (see Section 2.4), and identification of hazards and controls, documented as follows:

1. If conventional fall protection measures (guardrails, fall restraint or arrest equipment, safety nets) are feasible, an elevated surface work plan is used.
An elevated surface work plan must be developed by an authorized or competent person and approved by a competent person. Plans for subcontractor construction work must in addition be accepted by a SLAC competent person. The plan will address associated fall hazards and provide a rescue plan as required. (See Fall Protection: Elevated Surface Work Plan Form.)

2. If conventional fall protection is impractical or creates a greater hazard, a control line can be set up and workers can work behind that line in the designated area without fall protection. If a worker needs to work beyond the control line, in the control access zone (CAZ), a fall protection plan must be developed.

The fall protection plan must be written by a qualified person and approved in writing by the SLAC chief safety officer and the Department of Energy (DOE) site manager or designee. (See Fall Protection: Fall Protection Plan Requirements for required elements of such a plan.)

Authorization through an elevated surface work plan or fall protection plan must be noted in the worker’s activity and training authorization documents, which must reflect any fall hazard, regardless of how the work is authorized.

2.2.2 Control Line

An example of unconventional means would be working in a designated area inside a properly set up control line with an elevated surface work plan. Work beyond the designated area, in the controlled access zone (CAZ), requires a fall protection plan. (See Figure 1.) (The first worker up can set up the control line without using fall protection, “first man up rule”. Once the control line is set workers must stay behind the control line.)

The control line must meet the following requirements:

- Be erected not less than six feet nor more than 25 feet from the unprotected or leading edge
- Extend the entire length of the unprotected or leading edge and be approximately parallel to it
- Be connected on each side to a standard railing or wall or securely anchored on each end
- Be flagged or otherwise clearly marked at not more than six-foot intervals
- Be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches from the working level/working area and its highest point is not more than 45 inches
2.2.3 Transit from Ladders

Until barriers or other effective methods of fall protection can be installed, transit to and from ladders at roof edges will be permitted when all of the following conditions exist:

- The roof being accessed is a *low-slope roof*.
- There are no current adverse environmental conditions affecting ability to see or move safely over the roof (such as high wind, extreme heat or sun glare, heavy rain).
- Safe ladder usage

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**Figure 1** Control Access Zones and Designated Areas

**Control Line Requirements**

- Erected not less than 6’ nor more than 25’ from leading edge
- Extend entire length of leading edge
- Be flagged or otherwise clearly marked at not more than 6’ intervals
- Supported so the lowest point is not less than 39” or more than 45”
- Have a minimum breaking strength of 200 lbs.
– A fixed ladder is used that has proper grab rails over the roof edge or parapet, conforms to regulations, has been inspected and labeled by a competent person, and is deemed safe for climbing, or
– A portable straight ladder is used that has been set up on a stable base, is properly secured to prevent movement, and extends at least three feet above the roof landing surface.

- Immediately upon reaching the roof, the person immediately walks away from the edge to the location on the roof where the work is to be done.
- To descend, the person approaches the ladder at an angle perpendicular to the roof edge to maximize distance from the edge during access.
- When performing elevated work an elevated surface work plan must be used. If an elevated surface work plan is not feasible then a fall protection plan must be used.

2.2.3.1 Non-conforming Fixed Ladders

Pre-engineered fall arrest equipment (such as an approved ladder climbing system or self-retracting lifeline) must be used on fixed ladders over 20 feet in height that do not have required landing platforms and compliant cages. Such fall arrest equipment must be installed under the supervision of a competent person.

2.3 Fall Protection Equipment

2.3.1 Use of Fall Protection Equipment

When an elevated work surface cannot be accessed safely from a ladder or protected work platform or when the installation of guardrails is infeasible, fall restraint or fall arrest systems may be used. A competent person will make the appropriate equipment selection based on a complete evaluation of the work site, conditions, and nature of work to be done, as documented in an elevated surface work plan.

Workers will use harnesses, self-retracting lifelines, lanyards, I-beam straps, and so on only as permitted by the equipment manufacturer and in accordance with published instructions unless authorized by a designated competent person.

2.3.1.1 Two-person Rule

Workers using fall restraint or fall arrest systems or control lines must work in teams of two or more (two-person rule).

2.3.1.2 Overhead Work

If work is being done in a location overhead where others may be working or walking below, access to that lower area must be restricted if any items could be dropped or fall from the higher work level. This can be accomplished through the use of barricade tape, signs, and rigid barriers. Signs and barricades will be removed when work is completed.

Tools and materials being used over an occupied area must be secured (tethered) to the structure or person if they might be dropped to the lower level. Toe boards must be provided on working platforms and scaffolds over six feet in height.
2.3.2 Fall Restraint Systems

Fall restraint systems consisting of the following minimum components may be used to prevent free fall:

- Rated and approved anchorage point with a capacity at least four times the intended load or 800 pounds, whichever is greater
- Lanyard (length must be limited to prevent access to edges where fall could occur)
- Connecting hardware (double-locking snap hooks, carabiners, D-rings)
- Full body harness

2.3.3 Fall Arrest Systems

Minimum fall arrest system components are

- Rated anchorage point of at least 5,000 pounds or as part of a complete personal fall arrest system that maintains a safety factor of at least two, and under the supervision of a qualified person
- Lanyard (length must be limited to prevent access to edges where fall could occur)
- Connecting hardware (double-locking snap hooks, carabiners, D-rings)
- Full body harness

When using a fall arrest system, the fall distance calculation must account for the length of lanyard, connecting hardware, deceleration distance, the height of the person wearing the equipment (or the height of the D-ring attached to the back of the harness), one foot of stretch in the harness, the position of the anchorage point, lanyard or rope elongation, and a safety factor.

A competent person must perform the fall distance calculation, or at a minimum verify that it was performed properly if calculated by someone else.

Depending on the above variables, the minimum height required for a fall arrest system to be effective in preventing contact with a lower level may be as much as 18 feet. Fall arrest systems should not be used at heights with less than 18 feet clearance to a lower level unless it can be proven by a competent person that the person will not contact the lower level in a fall. Where vertical clearance is inadequate, another way to gain access to the elevated work location must be found (for example, scissors lift or ladder).

The area below and to the sides of the individual must be free of obstructions that could cause injury during a fall. Fall arrest systems must be rigged so that a person cannot free fall for more than four feet or so that the arresting forces on the body do not exceed 1,800 pounds.

Fall arrest systems should not be used to protect personnel working near vertical drop-offs such as roof edges and hoist areas due to the potential for a swing impact injury, and the difficulty of rescue. Instead, fall restraint systems should be used in these situations.

2.3.3.1 Rescue Plan

When fall arrest systems are in use, a competent person will develop an effective rescue plan specific to the work location and job being performed before work starts. All SLAC fall protection rescue plans will be documented in the elevated surface work plan. A written plan, prepared in advance, facilitates the training of rescue personnel by increasing their familiarity with specific areas difficult to access.
2.3.4 Self-retracting Lifelines

Self-retracting lifelines (SRLs) must be installed directly above the user’s head, or at shoulder height directly adjacent to the work area at a minimum. Extreme care must be taken to ensure the person will not be exposed to a swing hazard, strike objects below, or exceed the maximum permissible free fall distance or arresting forces on the body after a fall involving an SRL (such as may be the case if the SRL is mounted below shoulder level). A designated competent person must inspect and approve of all SRL installations before use.

Exceptions to installing an SRL at or above shoulder level near the work zone will be approved by a competent person when no other fall protection option is feasible, and when the installation complies with applicable regulations and manufacturers’ requirements addressing free-fall distance, arresting forces on the body, and swing fall hazards.

2.3.5 Anchorage Points

Rated and approved anchorage points will be easily identified on the elevated surface work plan. Only anchorage points that have been approved by a designated SLAC qualified engineer or that are known to hold at least 5,000 pounds (such as structural I-beams or properly-installed pre-manufactured points) will be used for fall protection purposes. Anchor points that are repeatedly used must be permanently marked or identified and inspected twice annually by a competent person.

Under no circumstances will workers tie-off to piping, unistrut, racks, bracing, ventilation fan housings, or any other non-approved locations. Permanent, fixed guardrails will not be used as anchorage points unless specifically engineered and marked as approved anchorage points by a SLAC qualified engineer.

2.3.6 Design of Fall Protection Systems

Only SLAC-designated qualified engineers may engineer and design fall protection systems such as anchorage points, horizontal lifeline systems, or safety nets. If commercially available systems are pre-engineered and certified to provide fall protection and comply with regulatory requirements, they may be installed and used under the direction of a competent person and do not require a separate design by a SLAC qualified engineer.

2.3.7 Equipment Inspection, Marking, and Storage

2.3.7.1 Inspections

Before each use, the user will inspect harnesses, lanyards, self-retracting lifelines, and connecting hardware for wear, damage, contamination, and other deterioration according to manufacturer’s instructions and checklists. Equipment not meeting inspection criteria will immediately be tagged DANGER – OUT OF SERVICE and will not be used.

Twice annually, a competent person will inspect personal fall protection systems according to manufacturers’ instructions and checklists. Such systems may include fixed, installed fall protection systems such as self-retracting reels, anchorages, lifelines, or personal systems such as harnesses, connectors, and lanyards. Ensuring the completion of inspections and required documentation is the responsibility of line management.
Line management must designate a competent person as custodian of inspection records. The competent person will retain documentation of the semi-annual inspection for three years. Documentation will include the name of the inspector, the date equipment was inspected, and the results of the inspection. The documentation will be made available upon request. The equipment itself will also be labeled with proof of inspection.

Any equipment exposed to in-use loading or potential damage will be sent back be to the manufacturer for complete inspection, rebuild if necessary, and recertification before being used again.

2.3.7.2 Marking

All fall protection system components will be labeled by the manufacturer according to ANSI/ASSE Z359.1 or ANSI/ASSE A10.32. Only designated competent persons are authorized to mark harnesses and lanyards with other information (such as name or department) to ensure proper ink is used to prevent material deterioration.

2.3.7.3 Storage

Fall protection system components will be stored away from direct sunlight and corrosive materials, oils and solvents, moisture, heat, or any other substance that may cause damage. Harnesses, straps, and lanyards will be hung by the D-ring or other connecting means to keep straps in a natural and untangled position when not in use.

2.4 Fall Protection Personnel

Work in *unprotected elevated work areas* requires workers to be *authorized persons*, trained in fall protection. Planning and oversight is provided by a *competent person*. Fall protection plans are prepared by a *qualified person*. Design of systems is provided by a *qualified engineer*. Competent and qualified persons and qualified engineers are designated by fall protection program manager in consultation with line management. (See the Competent and Qualified Persons and Engineers list.)

3 Forms

The following are forms required by these requirements:

- Fall Protection: Elevated Surface Work Plan Form (SLAC-I-730-0A21J-047). Form for documenting plan for working on unprotected elevated work platform or area
- Competent and Qualified Persons and Engineers

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- Completed elevated surface work plans and fall protection plans must be kept with other work authorization documents for the duration of the work
- Competent persons maintain fall protection equipment inspection records, for three years
The fall protection program manager maintains fall protection designations in the Competent and Qualified Persons and Engineers list.

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)
- Chapter 45, “Fall Protection”
  - Fall Protection: Fall Protection Plan Requirements (SLAC-I-730-0A21S-054)

Other SLAC Documents
- None

Other Documents
- American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) A10.32, “Personal Fall Protection Used in Construction and Demolition Operations” (ANSI/ASSE A10.32)
- American National Standards Institute (ANSI)/American Society of Safety Engineers (ASSE) Z359.1, “The Fall Protection Code” (ANSI/ASSE Z359.1)
Chapter 45: Fall Protection
Elevated Surface Work Plan Form

This form is available in the following formats:
1. Adobe Acrobat (pdf) (attached)
2. Microsoft Word (docx)

A generic version, for use by construction subcontractors who do not have their own equivalent form, is also available:
1. Adobe Acrobat (pdf)
2. Microsoft Word (docx)

General subcontractors must submit the completed, approved form to their SLAC field construction manager (FCM), who will acknowledge receipt by signing and attaching a SLAC Receipt of Subcontractor Form. A SLAC Health and Safety Services representative must also sign the receipt.
Sample form, see URL at top of page
Chapter 45: **Fall Protection**  
Elevated Surface Work Plan Form  
Product ID: 117 | Revision ID: 2457 | Date Published: 24 June 2022 | Date Effective: 24 June 2022  
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/fallFormES WP.pdf | docx  

**Instructions**  
This form must be completed and approved before any worker, construction or general industry, accesses an unprotected elevated work area. (An unprotected elevated work platform or area is any elevated work surface, including a roof less than six feet from the edge, that is not surrounded by a fixed barrier such as conforming guardrails or protective parapet or where a portable guardrail system cannot be used.) (See Fall Protection: Fall Protection Requirements [SLAC-I-730-0A21S-055]).  

1. Describe the work to be done, fall protection to be used, and list the workers involved (Section 1).  
2. Include a work plan drawing (Section 2).  
3. If fall arrest is needed, complete a fall hazard analysis (Section 3) and rescue plan (Section 4).  
4. Obtain approvals before work begins (Section 5).  

The plan may be completed by a fall protection authorized person or fall protection competent person but must be approved by a competent person. The completed plan must be kept with other work authorization documents for the duration of the work.  

No elevated surface work plan is required if a ladder or mobile elevating work platform (MEWP) can be used to both access the work area and complete the work safely. In such cases follow requirements in Chapter 15, “Ladder and Scaffold Safety” or Chapter 47, “Mobile Elevating Work Platforms”, as applicable.
### 1. Elevated Surface Work Plan

<table>
<thead>
<tr>
<th>Job / project name:</th>
<th>Begin date:</th>
<th>End date:</th>
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<tbody>
<tr>
<td>Location (bldg, floor, grid):</td>
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<td>Description:</td>
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**List authorized workers**  
Important: two or more authorized workers must be present whenever fall protection (fall arrest, fall restraint, or control line) is used.

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<thead>
<tr>
<th>Authorized worker name</th>
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**Indicate protection method to be used (pick one) and describe**

- [ ] Guard rail system
- [ ] Fall restraint
- [ ] Fall arrest (if fall arrest is used a fall hazard analysis must be developed (Section 3))
- [ ] Control line (designated area)

**List equipment to be used, such as full body harness, minimum length lanyard, shock absorber, connecting hardware, self-retracting lifeline**

Include specific manufacturer and model of equipment to be used. Attach manufacturer cut sheets. (Required for all construction activities, for general industry only for fall arrest.)
2. Work Plan Drawing

Both plan and elevation views are required. For both views show the work area, how it will be accessed, and all equipment used (ladder, mobile elevation work platform, anchorages points, restraint equipment, arrest equipment, barricades, etc). If fall arrest is needed, include details (free-fall and deceleration distance, worker height, lanyard length, etc.) and the rescue plan (Section 4). Add pages if needed.
3. Fall Arrest Analysis (Clearance Calculation)

Required when using fall arrest.

4. Rescue Plan

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Answers / Solutions / Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>How will rescue be ensured within 15 minutes, should a fall occur?</td>
<td>Immediate response is required to minimize the risk of further injury or death due to suspension trauma. List rescue equipment immediately available for this location and describe how it can be staged quickly should it be needed. Include whatever might be needed such as a ladder, aerial device, elevating work platform, tripod, additional harness, controlled descent device, winch, pulley, etc.)</td>
</tr>
</tbody>
</table>

Sample form, see URL at top of page
5. Approvals

<table>
<thead>
<tr>
<th>ESWP author (print):</th>
<th>Phone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESWP author (sign):</td>
<td>Date:</td>
</tr>
<tr>
<td>Competent person (print):</td>
<td>Phone:</td>
</tr>
<tr>
<td>Competent person (sign):</td>
<td>Date:</td>
</tr>
</tbody>
</table>
Chapter 45: Fall Protection

Fall Protection Plan Requirements

Product ID: 89 | Revision ID: 2459 | Date published: 24 June 2022 | Date effective: 24 June 2022
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/fallReqFallPlan.pdf

1 Purpose

The purpose of these requirements is to ensure the safety of workers in unprotected elevated work areas in which conventional fall protection is impractical. They cover developing and approving fall protection plans. They apply to workers, qualified persons, the SLAC chief safety officer, and the Department of Energy (DOE) site manager.

2 Requirements

When the use of conventional fall protection (guardrails, fall restraint or fall arrest equipment, safety nets) is impractical or creates a greater hazard, a fall protection plan must be used.¹ (For more on authorizing work involving fall protection, see Fall Protection: Fall Protection Requirements). A fall protection plan must

- Be used for construction work only. A fall protection plan may be applied to general industry work, but only on a case-by-case basis as determined by the local compliance officer (DOE site manager or designee).
- Demonstrate why conventional fall protection cannot or should not be used
- Be prepared and changed only by a qualified person and developed specifically for the site where the work is being performed
- Name the qualified person who developed the plan
- Be approved in writing by the SLAC chief safety officer and the Department of Energy (DOE) site manager or designee
- Be kept up to date as the project progresses or conditions change
- Be kept at the job site
- Be implemented under the supervision of a competent person in fall protection, who must be identified in the plan
- Include written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection provided by conventional fall protection systems

- Identify locations where conventional fall protection methods cannot be used and designate these locations as controlled access zones (CAZs), cordon them off using a control line (see Figure 1), and identify each worker allowed to work in the CAZ. Other workers may work within the control line, in the designated area, under an elevated surface work plan (see Fall Protection: Fall Protection Requirements).

- Implement a safety monitoring system as needed when workers are in the CAZ, including making sure workers work in teams of two or more.

**Figure 1** Controlled Access Zone Requirements

**Control Line Requirements**

- Erected not less than 6’ nor more than 25’ from leading edge
- Extend entire length of leading edge
- Be flagged or otherwise clearly marked at not more than 6’ intervals
- Supported so the lowest point is not less than 39” or more than 45”
- Have a minimum breaking strength of 200 lbs.
3 Forms

The following are forms required by these requirements:

- None

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- Completed fall protection plans must be kept with other work authorization documents for the duration of the work

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)

- Chapter 45, “Fall Protection”
  - Fall Protection: Fall Protection Requirements (SLAC-I-730-0A21S-055)

Other SLAC Documents

- None

Other Documents