



## University Facilities Fall Protection

### *University Facilities (UF)*

**Internal Policy:** SP6  
**Effective Date:** February 28, 2007  
**Last Modified:**  
**Approved by:** Bob Wells

#### I. POLICY

The policy of Clemson University Facilities (UF) is to promote a program for purchase, maintenance, inspection, and use of Fall Protection Equipment to minimize the personal hazard of working above six feet.

#### II. SCOPE

This standard covers fall protection equipment, use of controlled access zones, warning line system or safety monitor for low slope roofs. It does not apply to use of scaffolds, ladders (See SP8-in process), cranes and derricks, steel erection, underground construction, stairways, electric transmission and distribution lines, and personal climbing equipment. Requirements for excluded areas are covered under OSHA Subparts L, N, R, V and X.

#### III. DEFINITION OF TERMS

- A. The word "shall" is to be understood as mandatory.
- B. Owning Supervision - Any Supervisor responsible for campus and/or equipment.
- C. Types of fall protection equipment covered in this standard are:
  - 1. Body Harnesses - a design of straps which is secured about a person in a manner to distribute fall arresting forces over at least the thighs, pelvis, waist, chest and shoulders, with provisions for attaching it to other components of a personal fall arrest system. Also known as a Full-Body Harness.
  - 2. Shock Absorber Packs - a component of a personal fall arrest system which allows dissipation of energy by extending deceleration distance reducing fall arrest forces.
  - 3. Lanyard - a flexible line of rope, wire rope/cable, or webbing which generally has a connector at each end for securing a body belt or body harness to a lifeline, deceleration device or anchorage.
  - 4. Anchorage - a secure point of attachment for lifelines, lanyards or deceleration devices.
  - 5. Anchorage Connector – used to join the connecting device (lanyard, lifeline, or deceleration device) to the anchorage.
  - 6. Lifeline - a line provided for direct or indirect attachment to a body belt, body harness, lanyard, or deceleration device. Such lifelines may be horizontal or vertical in application.
  - 7. Self-Retracting Lifelines - a deceleration device containing a drum-wound line which can be slowly extracted from or retracted onto the drum under

slight tension during normal worker movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

- D. Controlled access zone (CAZ) means an area in which certain work may take place without the use of guardrail systems or personal fall protection.
- E. Leading edge means the edge of a floor or roof which changes location as additional parts or formwork is added.
- F. A Low Slope Roof means a roof having a slope less than or equal to 4 inches rise in a horizontal distance of 12 inches.
- G. A "competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are hazardous or dangerous to persons and who has authorization to take prompt corrective action to eliminate them.
- H. A "qualified person" means one who by possession of a recognized degree or certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.
- I. For purposes of this safety standard, "Construction Work" means work for construction, alteration, and/or repair including painting and decorating.
- J. Suspension Trauma (Orthostatic Intolerance) – when a person falls and remains both vertical and sedentary for a period of time, blood pools in the veins of the legs, which could result in unconsciousness. If a person is not rescued quickly, permanent damage and possibly death may result.

#### IV. RESPONSIBILITIES

- A. It is the responsibility of the Preventive Maintenance Program Developer (PMPD) to notify Owing Supervision when their fall protection equipment is due for periodic inspection.
- B. The appropriate Director or his designee will select staff who will be inspecting all the fall protection equipment.
- C. It is the responsibility of the Owing department supervision and operators, the servicing department supervision/mechanics, and the retrieval equipment inspectors to be thoroughly familiar with this standard and to abide by the training requirements, work practices and procedures described in it.
- D. The Owner or the person who prepares the purchase requisition for fall protection equipment will specify equipment that equals or exceeds this Standard and OSHA regulations for Fall Protection
- E. It is the responsibility of UF Management to insure that the procedures of this standard are followed.
- F. Supervisors are responsible for administering progressive discipline in accordance with the SC State Personnel Manual and Clemson University guidelines when subordinate personnel repeatedly fail to comply with this procedure as required.

- G. Maintenance Stores Procurement Specialists shall notify the PMPD when purchasing any fall protection equipment.

V. PROCEDURE

A. New Fall Protection Equipment

1. All fall protection equipment that is covered by this standard shall meet OSHA specifications. Personal fall protection equipment shall not be fabricated in the maintenance shops. All fall protection equipment shall be delivered to the PMPD for registration.
2. As of January 1, 1998, body belts are illegal per OSHA regulations and are not permitted on campus.
3. All body harnesses are to be equipped with two (2) Relief Step Safety Devices (Miller model 9099) to provide support in the event of a fall until rescue.

B. Inspection

1. All new equipment or repaired equipment for fall protection shall be delivered to the PMPD for the purpose of identifying it and getting it into the inspection program. Also, existing fall protection equipment that is not in the inspection program shall be delivered to the PMPD to be entered into the program.
2. The PMPD will notify the Owner when their fall protection equipment is due for periodic inspection and will issue work orders for the inspections.
3. After receiving the inspection message, the Owner will deliver their fall protection equipment to the designated area for inspection.
4. A qualified person (Inspector) shall thoroughly inspect all harnesses, and other fall protection equipment when it is initially received and thereafter every six months. To verify inspection, the appropriate colored tie wrap will be attached to each piece of the retrieval equipment. Red is for the first half of the year. Yellow is for the second half of the year. The date of the next inspection due date (Month/Year) will also be written on the tag. Any equipment that is found to be defective will be tagged with a "DANGER DO NOT OPERATE" tag. One of the Inspectors will notify the owner when the inspections are completed and will assist the owner in arranging for repairs.
5. The Owner of the fall protection equipment will pick up the equipment after inspections are completed. Any defective equipment will not be used and will not be stored in the same location as the equipment that was approved by the Inspectors. Defective equipment will be repaired or disposed. Requisitions will be issued by the owner to repair or to replace defective equipment. When defective equipment is disposed, the PMPD must be notified so that the equipment numbers can be removed from records.
6. Prior to each use, fall protection equipment shall be inspected by the user of the equipment for wear, damage, or other deterioration. Defective

components shall be removed from service and tagged with a "DANGER DO NOT OPERATE" tag by the user of the equipment, owning Supervisor, or a qualified person. The Owner of the retrieval equipment shall be notified so that equipment can be repaired or replaced.

C. Storage

Fall protection equipment shall be stored where it will not be exposed to the elements and where there is good ventilation. It should not be stored near radiators, stoves, or steam pipes, nor in other places subjected to excessive heat or dampness. Satisfactory methods of storage are:

1. Hang equipment on brackets against the wall.
2. Do not store fall protection equipment in toolboxes or job boxes. Equipment can be stored in packs or portable cases provided that equipment is protected from wear and metal-to-metal contact.

D. General Safe Practice for Fall Protection Equipment

1. Fall protection systems are required whenever persons in construction activities are exposed to a fall of six feet or more.
  - a. When working 18.5 feet above grade level a 6ft. shock absorbing lanyard may be used
  - b. When working less than 18.5 feet above grade level a self-retracting lanyard shall be used.
2. Persons working above equipment must also be protected from falling.
3. Each person at the edge of an excavation, hole, well, pit, shaft, and similar excavation 6 ft. or more in depth shall be protected from falling by guardrail systems, fences, barriers, or covers.
4. Covers for holes shall support without failure twice the weight of persons, equipment, and vehicle wheel loads. Covers must be secured to prevent movement and marked with the word "hole" or "cover". This rule does not apply to steel grates or cast iron manhole covers on streets.
5. For fall protection there is a choice of one of the following alternative methods:
  - a. Guardrail Systems
  - b. Personal Fall Protection Equipment
  - c. For low slope roofs fall protection can be provided by the warning line system.
  - d. A controlled access zone can be used for brick laying, leading edge work, and precast concrete work. A fall protection plan is required.

- e. Use a safety monitor which is restricted to low slope roofs less than 50 ft in width. A fall protection plan is required.
6. Prompt rescue of a person who falls shall be provided unless the person is able to return to the work area.
7. No materials except masonry and mortar can be stored within 4 ft of the working edge.
8. Materials and equipment may not be stored within 6 feet of a roof edge unless guardrails are erected at the edge of the storage area and the material is stable and self-supporting.
9. Lanyards and lifelines should be attached above the worker whenever possible to minimize the potential fall distance.

E. Guard Rail Systems for Construction

1. The top edge height of the top rails must be 42 inches, plus or minus 3 inches, above the walking/working surface. If there is no wall at least 21" high a midrail shall be provided. Do not extend the top rail beyond the terminal posts.
2. At any point, the guardrail system must be capable of withstanding a force of at least 200 pounds applied within 2 inches of the top edge.
3. The guardrail system must also be designed to prevent injury from punctures or lacerations and to prevent snagging of clothing.
4. Guardrails used on ramps and runways must be erected on each unprotected side or edge.
5. Top rails or midrails constructed of manila, plastic or synthetic rope must be inspected as often as necessary to ensure that it continues to meet the strength requirements specified in the standard.
6. Toe boards shall be erected along the edge to protect persons below, must withstand a force of 50 lbs and be at least 3 1/2" high.

F. Fall Protection Provided by Personal Fall Protection Equipment

1. Always read instructions and warnings on any fall protection equipment. Do not mix and match equipment from different manufacturers. All parts of a fall protection system must meet OSHA Construction Standard 1926.502 (d).
2. Full body harness and shock absorbers should be used when ever possible. The harness design shall use leg straps and chest strap.
3. Attach fall-arrest connecting device to the D-ring on the backside of the harness. Side D-rings shall only be used for positioning.
4. Select anchorage points that will support 5,000 pounds per attached person.

5. All connecting devices shall contain locking snaps to reduce the possibility of accidental disengagement or "rollout". Pressure must be applied to both sides of the snap to open the snaps.
6. Horizontal lifelines must be designed, installed and used under the supervision of a qualified individual, as part of a complete personal fall arrest system which maintains a safety factor of at least two.
7. Each person shall be attached to a separate vertical lifeline except for elevator construction.
8. D-rings, snaphooks, lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds. No deformation of snap hooks and D-rings is allowed at a force of 3,600 pounds.
9. Lifelines must be protected against cuts and abrasions.
10. Self retracting lifelines and lanyards which limit free fall distance to 2 feet or less must be capable of withstanding a minimum tensile load of 3,000 pounds. Those which do not limit free fall to 2 feet or less must be capable of sustaining a minimum tensile load of 5,000 pounds.
11. Personal fall arrest systems, when stopping a fall must limit the arresting force on an employee to 1,800 pounds when used with a body harness. Personal fall arrest systems must be rigged to prevent an employee free fall more than six feet, and to bring an employee to a complete stop. The deceleration distance to absorb the kinetic energy of a falling person will be limited to no more than 3.5 feet.
12. The fall protection system must have sufficient strength to withstand twice the potential energy of an employee free falling a distance of 6 feet or the free fall distance provided by the system, which ever is less.
13. Any personal fall protection system subjected to a fall must be immediately removed from use and not used again until it has been inspected and approved by a competent person. Dispose of any lanyards that have been used in a fall.

G. Warning Line Systems For Low Slope Roofs

1. Must be erected around all sides of the work roof area. If mechanical equipment is not being used, the warning line shall be not less than 6 ft. from the roof edge.
2. When mechanical equipment is used, the warning line must be erected not less than 10 feet from the roof edge which is perpendicular to the direction of travel of the equipment. Parallel to the equipment travel, the warning line shall be not less that 6 ft from the roof edge.
3. Warning lines must consist of ropes, wires or chains and be flagged not more than 6 feet spacing with high visibility materials. Height of warning line, including any sag at the low point, shall be from 34 to 39 inches.
4. Points of access and hoisting areas shall be connected to the work area by an access path formed by two warning lines. When the path to the point of access is not in use, a rope, wire chain, or other barricade shall

be placed where the path intersects the warning line erected around the work area.

- H. Controlled Access Zones can be provided for overhand brick laying, leading edge work, and precast concrete work which do not require personal fall protection equipment as follows:
  - 1. When it can be demonstrated that it is infeasible or creates a greater hazard to use personal fall protection, a fall protection plan shall be implemented. Refer to OSHA section 1926.502 (k) on how to prepare the Fall Protection Plan.
  - 2. When a controlled access zone (CAZ) is used for leading edge and other work, the CAZ must be defined with a control line or other means to restrict access. The control line must have a breaking strength of at least 200 pounds.
  - 3. Lines must consist of rope, wires, tapes or equivalent materials, and must be flagged at not more than 6 foot intervals with high visibility materials. The height of the control line must be from 39 to 45 inches.
  
- I. A Safety Monitoring System can be used to protect employees involved in roofing operations on low slope roofs provided the width of the roof is less than 50 feet.
  - 1. When it can be demonstrated that it is infeasible or creates a greater hazard to use personal fall protection, a fall protection plan shall be implemented. Refer to OSHA section 1926.502 (k) on how to prepare the Fall Protection Plan.
  - 2. Mechanical equipment shall not be used or stored in areas where safety monitoring systems are being used.
  - 3. No person other than the persons engaged in roofing work or persons covered by the fall protection plan shall be allowed in the area covered by the safety monitor.
  - 4. Personal fall protection equipment is desirable but not required. A competent person is designated as the safety monitor who must:
    - a. Recognize fall hazards.
    - b. Be on the same walking/working surface.
    - c. Be within visual sighting distance and close enough to warn employees orally.
    - d. Not be conducting any other activity that may distract him/her from their monitoring role.

## VI. TRAINING

- 1. A competent person shall train each person in the inspection of fall protection equipment or who might be exposed to a fall hazard. This training shall enable each trained person to recognize the hazards of falling and the procedures to be used to minimize these hazards.
  - a. Training shall include the correct procedure for erecting, maintaining, disassembling, and using the specific fall protection system to be used.

- b. Training shall also include:
  - How to ascertain whether their personal protective equipment is properly fitted and worn, so that it performs as intended;
  - How orthostatic intolerance/suspension trauma may occur;
  - The factors that may increase a worker's risk;
  - How to recognize the signs and symptoms of orthostatic intolerance/suspension trauma; and
  - The appropriate rescue procedures and methods to diminish risk while suspended.
- c. Training shall be documented, including the date of the training, the trainees' names and trainer's signature.
- d. Retraining is required when it is demonstrated that employees lack the necessary understanding about fall hazards and protection methods. Retraining is also necessary when new fall protection systems are implemented and/or when new fall hazards arise.

## VII. EXCEPTIONS

- A. Any request for exception to this standard shall be submitted, in writing, to the EHS Department for their consideration.
- B. The provisions of this standard do not apply when employees are making an inspection, investigation, or assessment of workplace conditions before the actual start of construction work or after all construction work has been completed.

Note! Other information on Personal Fall Protection Equipment can be found in OSHA 1926.21, 1926.32 Definitions, and 1926.500 to 1926.503 Subpart M-Fall Protection.