DEPARTMENT OF THE NAVY (DON)

FALL PROTECTION GUIDE

May 2024

Contents

INTRODUCTION

1.1 Purpose

This Guide provides criteria, best practices and applications in accordance with (IAW) requirements prescribed in references (b), (c), and (d) for developing and managing Fall Protection programs to protect all personnel (military and DON civilians) at Navy and Marine Corps Activities.

1.2 Background

According to Bureau of Labor Statistics (BLS), Falls to lower levels in 2021-22 were a major hazard to workers. Workers in private industry, state government, and local government suffered 92,010 injuries resulting in days away from work because of falls to lower levels, and in 2022 700 workers across private industry and all levels of government lost their lives because of such falls. Falls to lower levels accounted for nearly 4.18 percent of all injuries and illnesses that required days away from work and for 12 percent of all fatal work-related injuries. The falls resulting in nonfatal injuries required that workers take a median 22 days away from their job, significantly higher than the 15 days for all nonfatal injuries and illnesses.

In contrast, falls on the same level accounted for more injuries with days away from work, but fewer fatal injuries. In 2021-2022, there were 275,660 cases with one or more days away from work due to falls on the same level. Falls on the same level resulted in 144 fatal injuries.

The number of nonfatal falls to a lower level has decreased in private industry since 2020, while the number of fatal falls to a lower level for private industry has increased slightly, from 680 in 2021 to 700 in 2022. Most of this change was in the private construction and extraction industry, whose fatal falls increased from 379 to 423, or 11.6 percent, from 2021 to 2022. During this period, total hours worked in the private construction industry increased by 3.4 percent.

The majority of the workers who missed days of work because of fall injuries were men, while 24.98 percent were women. In 2022, 700 workers died as a result of falls to a lower level. The vast majority (97.5 percent) were employed in private industry. Self-employed workers accounted for 26.4 percent of the total, a percentage that was higher than their percentage of all fatal work injuries (19.9 percent). The overwhelming majority (98.2 percent) were men.

As with the nonfatal fall injuries, the source of injury was often a ladder at 22,710 incidents. A vehicle was the source of injury in 11.8 percent of the cases, with trucks accounting for 8.1 percent; and injuries accounted for 25% of injuries, collapsing structures accounted for 6,130 cases or percent. In 2022 Intracranial injuries remained roughly the same at 240 counts or 41.0 percent of the fatal fall injuries. Over half (56.1 percent, or 393cases) of the fatal fall injuries occurred in the private construction industry. Of these cases, 99 occurred in the roofing contractor industry, and another 60 occurred in the residential building construction industry.

Conclusion

Falls to a lower level continue to be a major hazard to workers. These falls are the source of 12.75 percent of all fatal occupational injuries; in the construction industry, falls to a lower level account for 37.3 percent of fatal injuries. Falls to a lower level represent 4.18 percent of nonfatal occupational injuries and illnesses in private industry, and these are among the most severe nonfatal cases, as shown by the 22 median days away from work in 2022. New data on the height of falls can help to quantify the increased risks of severe injury and death due to falling to a lower level from a height.

Conclusion

The DON continues to experience serious fall related mishaps, which lead to reduced readiness and productivity, as well as high medical and compensation costs resulting from these mishaps and suffering to victims and their families. Across the Navy there were three fall protection-related fatalities in the past five years. The causal factors for these fatalities were rooted in non-compliance with established policy/procedure and mandatory training. Primary factors attributing to these mishaps included improper Personal Protective Equipment (PPE) use and failure to properly identify and mitigate hazards related to unguarded edges. Beyond these fatal mishaps, 43% of all reported fall-related mishaps over the same timeframe involved unguarded edges over four feet. Commander Naval Safety Command Tier III assessment observations indicate that the underlying causal factors of these mishaps were present in all communities and internal self-assessment efforts were not effectively correcting this behavior.

The intent of this guide is to provide best practices for developing and managing Fall Protection programs to heighten awareness and protect all DON personnel exposed to Fall-Hazards in the workplace to all personnel exposed to work at heights or who manage fall protection programs. Falls are preventable. Careful planning and preparation lay the necessary groundwork for an accident-free workplace.

1.3 Scope

The scope of this guide is to assist in the development of a managed Fall Protection program and to be used as a best practices guide for Fall Protection for potentially affected workers exposed to Fall Hazards while conducting work at heights at US Navy and Marine Corps Activities/Commands.

This guide provides:

a. Definitions applicable to Fall Protection and rescue.
b. Guide for developing a managed Fall Protection program, a sample of a written program, program compliance audit checklist and step-by-step procedures on how to establish, manage and implement a Fall Protection program.
c. Best practice for conducting Fall Hazard surveys and the assessment process including the preparation of Fall Hazard survey report.
d. Fall Protection and prevention plan best practices, sample of the plan, and site-specific plan checklist.
e. Examples of various Fall Protection systems, criteria and design best practices.
f. Fall Protection best practices for specific applications (Working on roofs, inspection and investigation work, communication towers, scaffolds, aerial work platforms, common workplace conditions, ladders and stairs).
g. Best practices for fall rescue procedures, rescue equipment inspection, selective rescue equipment and systems and a sample rescue plan for Fall Hazard control and a site-specific fall arrest rescue plan checklist.
h. Best practices for Fall Protection equipment inspection, maintenance, storage, and care procedures including sample equipment inspection checklist and fall arrest system and equipment inspection checklist.
i. Anchorage considerations and selections of safe anchorages.

j. Consideration for design, inspection, certification and re-certification of anchorages and active Fall Protection systems.
k. Fall prevention considerations for management of Fall Hazards.
l. Fall Protection best practices for aircraft maintenance and inspection work.
m. Fall Protection best practices for architects/engineers and other inspectors conducting inspection, investigation and assessment work on roofs, or inspection and investigation of workplace conditions.
n. Additional considerations including falling object protection, hard hats, lockout tag-out, etc.
o. Information regarding reference (p)
p. Fall Protection best practices for shipboard (Afloat) maintenance, inspection, and repair work.

1.4 Navy/Marine Corps Fall Protection Policy

Per references (b), (c), (d), and (e), every Navy and Marine Corps Command/Activity having personnel working at height, exposed to Fall Hazards and using Fall Protection equipment is responsible for establishing, implementing and managing a Fall Protection program, which includes identification, elimination, prevention or control of Fall Hazards. Navy and Marine Corps Activities are responsible for assigning responsibilities; surveying and assessing Fall Hazards; providing prevention and control measures; training of personnel; proper installation and use of Fall Protection systems and equipment; and the availability of rescue equipment with accompanying rescue procedures and training of competent rescue personnel; inspecting the equipment and auditing and evaluation of the program. Fall Protection must be provided to Navy civilians and military personnel exposed to Fall Hazards on any elevated walking working surface with unprotected sides, edges, roofs, or openings, from which there is a possibility of falling 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.

a. The Regional Commander, Commanding Officer, Director or Officer-In-Charge of the Navy Command/Activity as well as Marine Corps Major Commands and Subordinate Commands are responsible for establishing, managing and implementing a Fall Protection program. Each Command, Unit, or Activity, which has personnel working at heights or exposed to Fall Hazards, is required to establish a written Fall Protection program. The latest version of this guide provides best practices for all Commands, Units, or Activities implementing a Fall Protection program. Each Command/Activity may prescribe additional requirements for special conditions above and beyond the Navy and Marine Corps policy.

1.5 Threshold Height Requirements for Fall Protection

The threshold limit for providing Fall Protection is mandated by references (b), (c), (d), (p), and the US Code of Federal Regulations (CFR).

The following table indicates the threshold limit for various industries, standards, regulations and instructions:

Industry	**Feet**	**Standard, Regulation Source**
General Industry	4	29 CFR 1910.28

Marine Terminals	4	29 CFR 1917.112
Shipyard/Ship repair/Shipboard ops (Afloat)	5	29 CFR 1915.159
Construction	6	EM 385-1-1 29 CFR 1926. Subpart M
Long-Shoring	8	29 CFR 1918 Subpart D

At construction sites, workers shall adhere to the threshold height no greater than 6 feet, as per reference (f) and (g). When Navy and Marine Corps personnel visit construction sites to inspect contractor's work, they may comply with the 6-foot threshold height because it would be infeasible to install guardrails at 4-foot height just for Navy and Marine Corps Personnel, when the OSHA Standards require a 6-foot threshold height for construction workers.

1.6 Compliance

Reference (m) and Section 19 of the Occupational Safety and Health Act (OSH Act) of 1970 and Executive Order 12196 prescribes requirements for federal employment occupational safety and health programs and contains provisions to assure safe and healthful working conditions for federal employees.

Under Section 19 of OSHA Act and reference (m), Occupational Safety and Health (OSH) programs shall be consistent and in compliance with the standards promulgated under Section 6 of the OSH Act of 1970. Section 6 of OSH Act directed by rule the Secretary of Labor to promulgate the Occupational Health and Safety Standard 29 CFR 1910.

Navy and Marine Corps personnel shall comply with the legal applicable OSHA Standards and references (a), (b), (c), (d), and (e) unless there are other alternate promulgated standards that are more specific to an Activity, Command or industry, such as the six-foot requirement for DON contractors performing construction and demolition work.

NOTE

Exceptions: When erecting or dismantling supported scaffolds when it is determined by a Competent Person for Fall Protection, that providing Fall Protection is not feasible or creates a greater hazard (for example: When it is necessary to erect scaffolding before erection of the structure, and requiring the scaffold structure to be erected or put in place.)

Department of Defense Instruction 6055.01, Safety and Occupational Health Program, applies to all DoD components. It does not apply to DoD contractor personnel and contractor operations.
The contractor is directly responsible for complying with federal and State occupational safety and health standards for its employees. **All regulations and standards for Fall Protection and health and safety contain minimum requirements. However, DoD Instruction 6055.01 does not preclude DoD components from developing standards that are more protective than OSHA.**

1.7 Comparison Among OSHA Standards Navy/Marine Corps and USACE EM 385 Fall Protection Requirements

Appendix B of this guide provides comparison among various OSHA Fall Protection standards (Construction and General Industry) and references (b), (c), (d), (e), and (f). When all the Fall Protection standards and regulations (specifically references (b), (c), and (f)) are compared, they are similar in the application and use of Fall Protection systems and equipment. The only difference is the threshold limit where Fall Protection is required (4, 5, or 6 ft. height) and few minor applications. These threshold heights primarily affect the level at which temporary guardrails and work platforms are installed or used. According to the International Building Codes, if there is a break of 30 inches (2½ feet) or more between levels, the edges must be guarded by permanent guardrails. Fall-arrest equipment cannot be used at these low elevations (i.e., 4 or 6 feet). The minimum clearance required for safely using fall-arrest systems is dependent on the length and type of the energy absorbing lanyard used, [e.g., Self-retracting Devices], the height of anchorage point, and available clearance. Work platforms, with minor modifications, can be adjusted to the required threshold height. A positioning system will require a minimum of 8 feet or more below the anchorage point. Additionally, restraint, travel restraint, warning line systems or designated area that may be used at any elevation will not be affected by the prescribed threshold limits of 4, 5 or 6 feet, because when using those systems personnel will not be exposed to a Fall Hazard. The only effect the threshold height limitations will have on safe walking working surfaces is the installation of temporary guardrails, existing loading docks, and parts of ramps above 4 feet.

End of Section

2 FALL PROTECTION PROGRAM

According to references (b), (c), (d), and (e), each Navy or Marine Corps Command, Unit or Activity, which has personnel working at heights and exposed to Fall Hazards, is required to establish a Fall Protection Program. The latest version of the DON Fall Protection Guide provides information in developing a comprehensive Fall Protection Program.

Navy or Marine Corps Commands, Units, or Activities supported by a Regional/Installation Safety Office can be included as part of the Regional/Installation Fall Protection Program. Coordinate with the Regional/Installation Safety Office to determine the level of support that will be provided.

2.1 Components of a Fall Protection Program

a. Signed Command/Activity Policy
b. Duties and Responsibilities
c. Workplace Surveys and Assessment of Fall Hazards
d. Fall Hazard Prevention and Controls, including the preparation of the Site-Specific Fall Protection and Prevention Plans
e. Training Requirements
f. Inspection, Storage, Care, and Maintenance of Personal Fall Protection Equipment
g. Rescue Plan and Procedures
h. Fall Mishap Reporting
i. Audits and Evaluation

2.2 Sample Written Fall Protection Program

See Appendix C

2.3 Fall Protection Program Compliance and Audit Checklist

See Appendix D

2.4 How to Establish, Manage, and Implement a Fall Protection Program

The following is a step-by-step procedure for establishing managing and implementing a Fall Protection program, arranged in chronological order:

1. Determine need for Fall Protection Program (are personnel working at heights)
2. Assign and designate Fall Protection Program Manager and Competent Person for Fall Protection;
3. Train the Fall Protection Program Manager and Competent Person for Fall Protection;
4. Program manager in collaboration with the Competent Person develop written Fall Protection program, Commanding Officer review and approval required;
5. Conduct fall hazard surveys and assessment and develop survey report; (may use ship class/installation wide survey to aid in unit survey if available)
6. Develop site-specific Fall Protection and Prevention Plan (If personal Fall Protection system is the planned method). The plan shall be developed either by the Competent Person or Qualified Person for Fall Protection;
7. Select type of Fall Protection system(s) and Fall Protection method(s) to be used;

8. Identify and train End Users on the use of Fall Protection equipment. Training shall be conducted by a Competent Person for Fall Protection;
9. Establish Fall Protection equipment storage area and develop requirements for care, maintenance and inspection procedures IAW manufacturer's instructions and recommendations;
10. Competent Person for Fall Protection select/identify and use of non-certified anchorages. A Qualified Person for Fall Protection will design the certified anchorages. A Competent Person for Fall Protection can install, use and inspect certified anchorages under the direction of the qualified person;
11. Develop rescue plan and procedures;
12. Train personnel in fall rescue;
13. Conduct refresher/update training as required.

2.5 Audits and Evaluations

See references (b) and (d) for guidance. The audit must be documented. See Appendix D for Fall Protection Program Compliance and Audit Checklist.

End of Section

3 WORKPLACE SURVEYS AND ASSESSMENT OF FALL HAZARDS

3.1 Fall Hazard Survey

Each Navy and Marine Corps Activity shall ensure that a survey of the workplace is conducted to identify potential Fall Hazards IAW references (b), (c), and (d). Navy and Marine Corps Activities shall determine whether the walking or working surfaces on which employees are to work on, have the strength and structural integrity to support the workers safely. Employees must not be permitted to work on those surfaces until it has been determined that the surfaces have the requisite strength and structural integrity to support the workers and equipment related to their task(s). Once it has been determined that the surface is safe for employees to work on, then it should be determined if a Fall Hazard exists at the work location.

A Fall Hazard Survey will help identify potential Fall Hazards at the workplace. The gathered information will provide documentation to 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. A Fall Hazard survey will help to identify options for Fall Hazard elimination and/or selection of other control measures. **The Fall Hazard survey must be validated annually for comparison purposes.**

Each command or activity having personnel exposed to Fall Hazards is responsible for the survey of those activities/hazards which expose their personnel to the Fall Hazard. At locations that multiple commands have personnel exposed to the same Fall Hazard, all involved commands may coordinate the survey efforts in order to save resources.

The survey information, required for identification of Fall Hazards, should include:

a. Interview of workers and their supervisors
b. Work-paths and movement of the workers
c. Range of mobility in each Fall Hazard zone
d. Location and distances to obstructions
e. Potential anchorage Location, if a Fall Hazard cannot be eliminated or prevented
f. Available clearance and total fall distance
g. Number of personnel exposed to Fall Hazards
h. Frequency and duration of exposure
i. Lock-Out/Tag-Out hazards
j. Potential severity of the fall
k. Access or egress to Fall Hazard area
l. Condition of floors and other surfaces
m. Review of any fall mishap reports at the facility
n. Identify the presence of any:
    - Hot objects, sparks, flames, and heat-producing objects
    - Electrical and chemical hazards
    - Sharp objects
    - Abrasive surfaces
    - Moving equipment and materials
    - Impact of weather factors
    - Other maintenance or work environment issues or conditions

When conducting inspection, assessment and investigation work on existing roofs systems or conducting Fall Hazard surveys, Navy personnel must perform their work in a safe manner. Navy personnel must

receive the proper training prior to accessing the roof and understand all the required safety precautions and requirements for conducting their work safely.

3.2 Fall Hazard Assessment

After a Fall Hazard survey is conducted at a workplace, a hazard analysis can be performed to assess the risk, hazard severity, and a fall mishap probability in accordance with the requirements in references (b), (c), (d) and (e). This will aid in prioritizing of hazard ranking and selection of the most viable Fall Protection solutions.

The primary consideration is to eliminate/remove potential Fall Hazards from the work place.

3.3 Fall Hazard Survey Report

Instructions for conducting a survey and preparing survey report

a. The survey shall be conducted for each Fall Hazard to which a person may be exposed to.
b. Identify one or more methods to eliminate or control Fall Hazards.
c. A person who is familiar with building operations and work procedures, and with access to information regarding work processes, environment, policy and best practices should accompany the individual conducting the survey.
d. The survey should include pertinent information as to the type of Fall Hazard showing basic configuration (graphic/drawings/photos).
e. The report must identify environmental factors that may affect the building/facility.
f. Establish risk factors to assist in the hazard ranking.
g. Revise the report whenever there is a change in work procedure/task equipment or requirements that will render the previous report obsolete.
h. Interview personnel that will be working at heights and exposed to Fall Hazards.

Note

The survey can be conducted by the Program Manager or the Competent Person for Fall Protection.

3.4 Sample Fall Hazard Survey Report

See Appendix E

3.5 Site-Specific Fall Hazard Survey Report

See Appendix F

End of Section

4 TRAINING

4.1 Training

See OPNAV M-5100.23 for Fall Protection training requirements.

4.2 Fall Protection Training Roster (Form)

See Appendix G.

End of Section

5 FALL HAZARD PREVENTION AND CONTROLS

5.1 Preferred Order of Control Measures

The preferred order of control measures for Fall Hazards is:

a. Elimination – Removal of the hazard from a workplace. This is the most effective control measure (e.g., lowering various 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).
b. Prevention – (traditional) - The isolation or separation of the hazards from the general work areas (e.g., same level barriers such as guardrails, walls, covers or compliant parapets).
c. Engineering Controls – Where the hazard cannot be eliminated, isolated, or separated, engineering control is the next-preferred measure to controlling the risk (e.g., design change or use of various equipment or techniques, such as aerial lift equipment or movable or stationary work platforms).
d. 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, posting of warning signs or training).
e. Personal Protective Systems and Equipment – These shall 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:

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

Navy or Marine Corps activities must 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 and references (b), (c), and (d).

5.2 Fall Protection and Prevention Plans

The Fall Protection and Prevention Plans as required by references (a, b, c, and d) and NAVMC SIR 5100.8 are documents prepared by the fall protection Competent Person or Program Manager for the purpose of planning, designing, installing, monitoring, and rescuing workers exposed to Fall Hazards; and to prevent fall accidents from occurring in the workplace. The Fall Protection and Prevention Plan is a living document that will require modification due to changes during different phases of work, procedures, methods of construction, or maintenance work. A Qualified or Competent Person for Fall Protection must be responsible for preparing the Fall Protection and Prevention Plans, as well as making any required changes, designs, updates, or approvals relating to various methods and best practices 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 must be recorded in the plan. Appendices (g) and (h) can be used to develop a Fall Protection and prevention plan.

5.2.1 Fall Protection and Prevention Plan Best Practices

The Fall Protection and Prevention Plan is different from the Fall Protection Plan required per 29 CFR 1926.502(k) and 29 CFR 1910.28 (b)(1)(C)(ii) Final Rule. A Fall Protection Plan as required by OSHA is

only available to employees, performing construction work and when working on residential roofs, who can demonstrate that it is infeasible, or it creates greater hazard, to use conventional Fall Protection systems: (i.e., guardrails, safety nets, or personal Fall Protection systems). 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. The site-specific and generic Fall Protection and prevention plan shall be prepared in advance.

For routine (frequent, lengthy and predictable) tasks, a site-specific *"Fall Protection and Prevention Plan"* shall be prepared and used. For non-routine (infrequent, temporary, and emergency) tasks, where fall-arrest/restraint or positioning system(s) are used, personnel may use a generic *"Fall Protection and Prevention Plan".* The generic Fall Protection and prevention plan shall include additional information on how to proceed with work safely, when unidentified fall hazard is encountered and what is the procedure to make the generic plan site-specific.

5.2.2 The Fall Protection and Prevention Plan Shall Include the Following:

a. Description of Fall-Hazards that will be encountered at the workplace by End Users during performance of their work.
b. Type of Fall Protection/fall prevention methods or systems used for every phase of work
c. Training requirements for every employee exposed to Fall Hazards.
d. Type of Fall Protection equipment and systems provided to the employees that might be exposed to Fall Hazards.
e. The names of qualified and Competent Persons for Fall Protection included in the plan.
f. The Fall Protection equipment and instructions for assembly, disassembly, storage maintenance, and care.
g. A Fall Protection and Prevention Plan is prepared by either a Competent or Qualified Person for Fall Protection. A Competent Person for Fall Protection will implement the plan. All employees working at heights and using personal Fall Protection equipment at a job site shall understand and agree to comply with the requirements of the Fall Protection and Prevention Plan.
h. The rescue plan and procedures shall be included as an enclosure to the Fall Protection and prevention plan.

5.2.3 Instructions for Preparing the Plan

a. The plan shall be prepared specifically for the workplace and the specific task (site-specific)
b. The plan shall provide for 100% continuous Fall Protection.
c. The plan shall include training requirements and qualifications of the end-user permitted to use the system.
d. The plan shall also include the following:
    1. Identification of acceptable and safe anchorages
        a) Certified anchorages selected and designed by a Qualified Person for Fall Protection and/or Non-Certified Anchorages selected by a Competent Person for Fall Protection
    2. Complete setup procedure(s) for access
    3. Clearance requirements for free-fall distances and for total fall distances including available and required clearance
    4. Detailed instructions for assembling, use and dismantling of the system(s), including descriptions of all the components

5. Number of personnel using the system
6. Any limitations of the system
7. Applicable manufacturers' standards and drawings
8. Detailed instructions for inspecting each component of the system, and intervals of inspection
9. Any other pertinent information.

5.2.4 Sample Fall Protection and Prevention Plan (Form)

See Appendix H.

5.2.5 Site Specific Fall Protection and Prevention Plan Checklist

See Appendix I.

5.2.6 When a Competent or Qualified Person for Fall Protection is required to Develop Fall Protection and Prevention Plan

See Appendix J.

End of Section

6 FALL PROTECTION SYSTEMS, CRITERIA AND DESIGN SYSTEM SELECTION

It is very important for a Qualified or Competent Person for Fall Protection to plan, evaluate, and select the most appropriate, safe, and efficient Fall Protection system. There are many Fall Protection systems available, which can be used. It is of the utmost importance to select the right system for a specific work application. A complete understanding of work procedures will enable the Qualified or Competent Person for Fall Protection to select the most appropriate Fall Protection system for work process being performed.

Redundant (Secondary) System

In every fall hazard situation, it is always advisable to have two protective systems, primary, and a secondary system as back up. If the primary system fails, the secondary system shall 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 FA system or a self-retracting lanyard is required as a secondary backup system. Always plan to have two Fall Protection systems, primary, and secondary.

6.1 Fall Protection Systems

Every employee on a walking working surface, exposed to a Fall-Hazard shall be protected from falling to a lower level by the use of a Fall Protection system. The most common Fall Protection systems are:

a. Prevention Systems (Passive Fall Protection Systems)
    1. Guardrail Systems
    2. Covers
    3. Safety Nets
b. Active Fall Protection Systems
    1. Fall-Arrest System
    2. Flexible Horizontal Lifeline System
    3. Rigid Horizontal Rail System
    4. Single Anchor Vertical Lifeline
    5. Climbing Ladder Fall Arrest System (Ladder Safety System)
    6. Restraint System
c. Other Fall Protection Systems
    1. Positioning System
    2. Warning Line System
    3. Designated Area
d. Other Engineered Fall Protection System
e. Suspended Rope Access
f. Ladder Cages (ladder cages are not be used after 2036 IAW OSHA Final rule)
g. Prohibited Fall Protection Systems
    1. Safety Monitoring System
    2. Controlled Access Zone

6.2 Fall Protection Systems Criteria & Best Practices

6.2.1 Prevention Systems (Passive Fall Protection Systems)

6.2.1.1 Guardrail System

Guardrail Systems are conventional methods for the prevention of falls from heights, which are installed at all open sided floors, openings and platforms where a person is required to walk or work. Guardrails can be temporary or permanent.

Open sided floor or edge means any side or edge (except at entrances to points of access of floors, roofs, working platforms, stairs, catwalks, scaffolds, and ramps or runways) where there is no wall or guardrail system.

A guardrail consists of top-rail, mid-rail, posts (stanchions) and toe-board.

Note 1:

Requirements for permanent guardrail systems installed in buildings are prescribed in the International Building Code (IBC) using the term "Guards" instead of guardrails. Permanent Guard requirements for height and strength are identical to guardrails prescribed by OSHA.

Note 2:

Guardrails shall be so surfaced as to prevent injury from punctures or lacerations, and to prevent snagging of clothing.

a. Criteria:

1. Top-rail. The top edge height of the top rails or equivalent guardrail system members shall be 42 inches high, plus or minus 3 inches above the walking/working level or surface. (39-45 inches high). The top edge height may exceed 45 inches, provided the guardrail system meets all other criteria in paragraph (a).

2. Mid-rails, screen, mesh, intermediate vertical members, solid panels, or equivalent intermediate members are installed between the walking-working surface and the top edge of the guardrail system as follows when there is not a wall or parapet that is at least 21 inches high

   a) Mid-rails are installed at a height midway between the top edge of the guardrail system and the walking-working surface
   b) Screen and mesh shall extend from the walking-working surface to the top rail and along the entire opening between the top rail supports
   c) Intermediate vertical (such as balusters) are installed no more than 19 inches apart
   d) Other equivalent intermediate members (such as additional midrails and architectural panels) are installed so that the openings are not more than 19 inches wide.

3. Supporting Posts shall be installed at whatever distance is necessary to meet the top rail strength requirement of 200 lbs. without failure (general Industry work). The verbiage "Posts shall be spaced no more than 8 feet apart on centers" was deleted per the Final Rule 29 CFR 1910 (11/2016). For construction work, per 29 CFR 1926, Subpart M, posts shall be spaced no more than 8 ft. apart.

4. Toe-board shall be minimum 3½ inches high, per 29 CFR 1926 Subpart M. According to 29 CFR 1910, the required toe-board height is 3 1/2 inches (nominal height of 4 inches).

Note:

Permanent guardrails shall be designed according to the International Building Code. The OSHA 42 inches +/- 3 inches' top rail height criteria is only for compliance purpose. The IBC requires the height of the top rail to be 42 inches (explicit number) without the +/- 3 inches range. However, the height can be increased if there are other factors that will require permanent guardrails to be between the range of 39-45 inches or even higher (i.e., using a stepladder to replace a light bulb near the guardrail).

b. Minimum Material of Construction

1. Wood Construction: Wood components shall be of construction grade lumber or better (minimum 1,500 pounds -ft./square inch fiber stress).

a) Top-rail and Posts shall be minimum nominal 2x4 lumber.
b) Mid-rail shall be made a minimum nominal 1x6 lumber.
c) Toe-board shall be made a minimum nominal 1x4 lumber.

Temporary Guardrail

2. Structural Steel: Posts, top-rail and mid-rail shall be at least 2 inches x 2 inches x 3/8- inch structural steel angles.

3. Pipe Railing: Posts, top-rail and mid-rail shall be at least 1 1/2 inches nominal diameter (schedule 40 pipe).

Removable Railing

Collapsible Railing

Temporary Pipe Railing Systems

Note:

The above removable railing is called a counterbalanced guardrail or movable weighted-base railing. Although temporary in nature, the required strength for guardrails may be attained if installed according to manufacturer's instructions.

However, there are removable sectional guardrails (non-penetrating) that can be connected together to make the system non removable (permanent) that requires the use of tools to attach all sections together and will be safer with regard to the impact of wind stresses on the system (see below). The designer has to research for this type of solution to make the system permanent.

Permanent Pipe Railings

4. Steel Cable: Top-rail and mid-rail shall be at least 1/4-inch steel cable flagged every 6 feet with high visibility material. There shall not be more than a 3-inch sag in the steel cable.

Steel Cable Guardrail

5. Chains: Steel chains for top-rail and mid-rail; all components shall have the same criteria for guardrail system above. There shall not be more than 3 inches of sag in the chain.

Note:
Guardrails or stair-rails shall be so surfaced as to prevent injury from punctures or lacerations, and to prevent snagging of clothing.

c. Guardrail Strength Requirements: The following are the ***minimum*** forces the temporary guardrail system members shall withstand without failure when applied within 2 inches from the top edge in any outward or downward direction:

1. Top-rails ----------200 pounds
2. Mid-rail ----------150 pounds
3. Toe-board ----------50 pounds

Any screen, mesh, intermediate vertical member, solid panel and any equivalent structural member shall withstand a force of 150 pounds.

When a 200-pound force is applied at the top edge of the top-rail in a downward direction, it shall not deflect more than 3 inches.

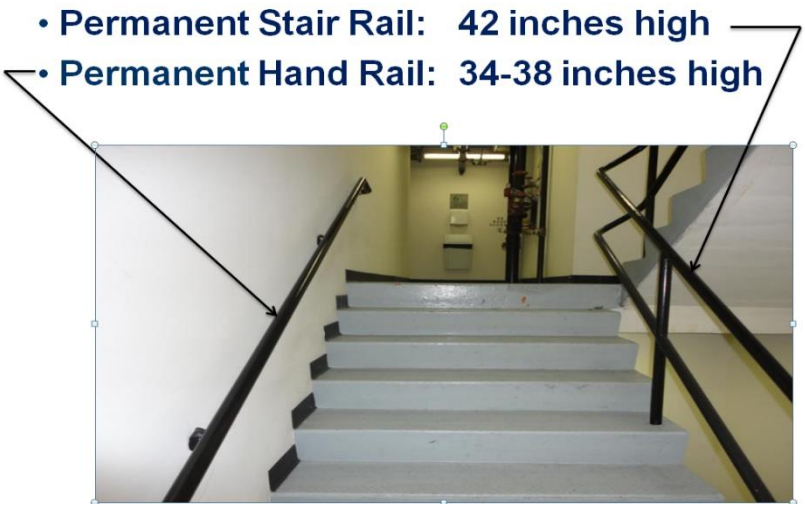
d. Best Practices for Guardrails at Hoisting Area: During hoisting operations If a segment or side of the railing system is required to be left open for easy access at an unprotected side, edge, hatch, etc., use self-closing swing gates, chain, removable guardrail section or fall arrest/restraint system will be required to protect personnel from falling. When guardrails are used at hoisting areas, a minimum 6 feet of guardrail shall be erected on each side of the access point through which materials are hoisted.

Removable Guardrail at second Floor

Loading Platform w/Removable Chain at point of access, however Mid Rail is also Required

Railing at Hoisting Areas

e. Stair Rails and Handrails:
   1. Stair Rails
      a) Permanent stair rails shall be 42 inches high (per International Building Code and OSHA 29 CFR 1910, Subpart D
      b) Stair rails shall be 36 inches high (per 29 CFR 1926.1052)
   2. Handrails
      a) Permanent handrails shall be mounted 34 to 38 inches high to the top of the rail (Per International Building Code)
      b) Handrails per 29 CFR 1926.1052 shall be 30-37 inches high
      c) Handrails per 29 CFR 1910 Subpart D shall be 30-38 inches high



Industrial Stairs

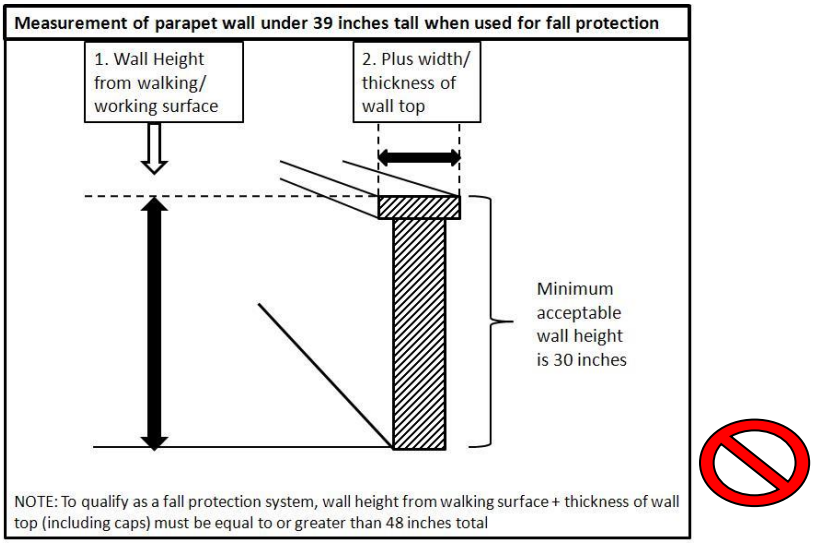
6.2.1.2 Parapets

In order for the height of the parapet wall to be in compliance with 29 CFR 1910 (Final Rule) it shall be 42 +/- 3 inches high.

According to IBC, parapets are usually designed for 30 inches high. The height of the existing parapets shall not be increased to comply with the guardrail height requirement of 42 inches ± 3 inches, without involving a structural engineer. Increasing the height of the parapet to 42 inches increases the exposure to wind stresses. Since the parapet resists wind by acting as a cantilever, the stresses at the base of the parapet (the level of the roof structure) is proportional to the square of the parapet height. For example, adding an extra foot to the existing 2-foot high parapet wall roughly doubles the wind stresses at the base. Recommend using either steel cable or railing to make the parapet 42 inches high (± 3 inches).

Above, solutions using additional railing to make parapets comply with OSHA 42-inch height requirement.

Before the latest Final Rule was published, OSHA permitted existing parapet walls with heights less than 42 inches; the rule stated that 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. The effective height of a parapet wall is the sum of the height of the wall plus the wall width at the top of the wall. Per the current Final Rule, the sum of 30 inches minimum height and 18 inches wide parapet walls equal to 48 inches is prohibited by OSHA. All parapet walls must be designed to a height of 42 inches (± 3 inches), to be considered adequate Fall Protection systems.



6.2.1.3 Covers

According to 29 CFR 1910, Subpart D and 1926.500, a hole means a gap or open space in a floor, roof, horizontal walking working surface, or similar surface that is at least 2 inches in its least dimension, through which material or tools can fall through; or, in the case of larger holes, a person can step or fall through. In either case, Fall Protection in the form of a secured and marked covering or barricade is required. Examples include manholes, pits, tanks, skylights, open shafts, chutes, and hatches. Consideration also should be given to guarding holes, which may present a trip or entrapment hazard.

a. Best Practices for Covers:
   1. Install a cover on any hole, 2 inches or more in its least dimension
   2. 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
   3. Covers shall be secured in place when installed
   4. If scissor/aerial lifts are on the same level, the potential for them to run over the hole-cover is high. This must be considered in the cover design

OSHA Compliant Cover

b. Skylights
   1. Skylight openings must also be covered. Most older skylights will not support the worker's weight.
   2. If there is a danger of falling through a skylight opening, a standard screen/mesh cover or temporary or permanent guardrail system must be installed on all sides of the skylight.

Skylight Solutions

Trenches, utility covers, and other similar features — when located in a roadway or vehicular aisle — shall be designed to carry twice the maximum axle load of the largest vehicle expected to cross over.

c. Hatches
   1. Hatches shall always be protected when opened
   2. If ladder is used to access thru a hatch, it shall extend 3 – 3 ½ feet above the walking working surface
   3. Hatch openings shall be provided with a means to facilitate access and exit from a fixed ladder (i.e. Grab Bars 42 inches high or other such items that can be grasped by the climber).
   4. According to 29 CFR 1910, Subpart D , when a guardrail system is used around holes:
      a) The ladder way or platform hole shall be protected by the use of a guardrail system and toeboards erected on all exposed sides, except the entrance to the hole where a self-closing gate or an offset shall be used
      b) The hole shall be protected on two sides when material is being passed
      c) Hole shall be protected on four sides when materials are not being passed




Hatch Cover Solutions

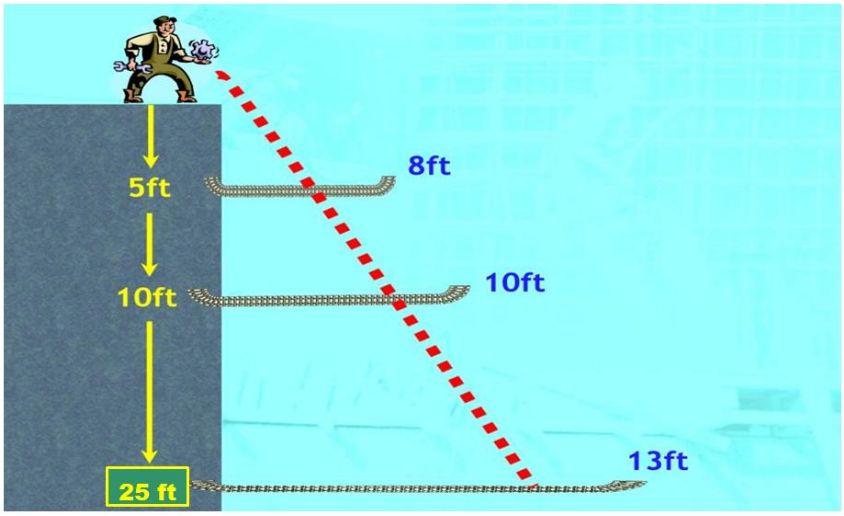
5. When guardrails are used around holes that serve a point of access the opening shall have a swinging gate or offset to prevent an employee from walking or falling into the hole.

6.2.1.4 Safety Nets (N/A for Afloat)

Safety nets are considered passive Fall Protection systems. They are installed as close as practicable below the leading edge for employee protection or when working over water, on bridges, or high-rise buildings or structures.

a. The minimum breaking strength of border rope or webbing shall be 5,000 pounds
b. The mesh opening shall not be larger than 36 square inches or longer than 6 inches on any side
c. In any case, the net shall be installed not lower than 25 feet from the working surface
d. Safety nets shall extend out from the working surface as follows:

Distance from working level to the net	Distance the net shall extend from working surface
Up to 5 feet	**8 feet**
Over 5 feet up to 10 feet	**10 feet**
Over 10 feet	**13 feet**



Safety Net Extensions

e. Safety nets shall be tested in the suspension position in the field and certified by a Qualified Person immediately after installation and at six-month intervals using a drop test of 400 pounds, dropped from the same elevation a worker might fall.
f. Inspect safety nets immediately after installation, weekly thereafter, and following any alteration or repairs. Inspection results must be documented.
g. Shackles and hooks used for safety net installations shall be made of forged steel.
h. Immediately remove any debris that falls into the net.

6.2.2 Active Fall Protection Systems

6.2.2.1 Fall Arrest System

A Fall arrest system is an assembly of components and subsystems used to arrest a fall. Fall arrest Systems consists of the following subsystems and components:

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

Note:

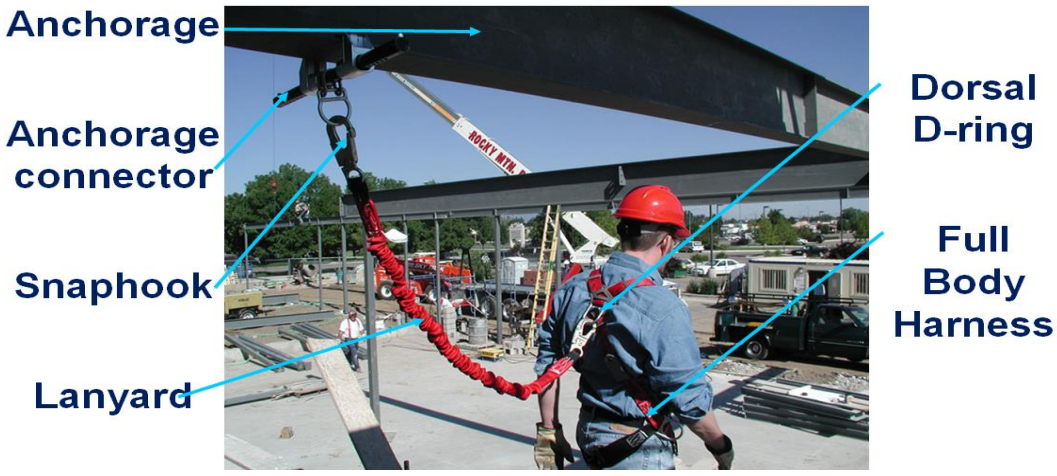
Fall-arrest is considered an active Fall Protection system. The system will become activated when a fall is initiated. A Fall-arrest system is also considered a secondary or backup system.

Note:

Whenever possible, employees should work in pairs (buddy system).

WARNING

Personal Fall Protection systems (PFPS) are typically certified and labeled only within the capacity range of 130 lbs without including the weight of, equipment, clothing and tools to 310 pounds (59 to 140.6 kg) including the weight of the worker, equipment, clothing and tools by the manufacturer. Workers must not be permitted to exceed the manufacturers designed weight limits. The concern for End Users with body weight more than 310 pounds is the potential to fully deploy the energy absorber and expose the wearer to arresting forces greater than 1,800 pounds. The concern for End Users with body weights less than 130 pounds is the arresting forces (G force) that they may experience if the energy absorber does not deploy properly as prescribed by OSHA and ANSI Z359 Standards.



Fall Arrest System

6.2.2.2 Fall Arrest System Best Practices

Elements of a Personal Fall Arrest System (PFAS) consist of an anchorage system, which includes the anchorage (rigid part of the structure) and anchorage connector, connecting means, which may include energy absorbing lanyard, self-retracting device, fall arrester or lifeline, and a full body harness or suitable combinations. The PFAS must be capable of arresting a free fall safely, suspend the victim vertically while awaiting rescue, and allow rescue personnel to accomplish identified tasks in a fall hazard situation. All components and subcomponents of a PFAS must be compatible.

OSHA Requirements:

a. The system shall limit the maximum arrest force on the worker´s body to 1,800 pounds, when wearing a full-body harness
b. Maximum free-fall distance shall not exceed 6 feet for a Fall Arrest lanyard rated for a 6-foot free-fall
c. The system shall stop the fall within a deceleration distance of not more than 42 inches
d. Maximum free-fall distance shall not to exceed 12 feet for a Fall Arrest lanyard rated for a 12-foot free-fall
e. The system shall stop the fall within a deceleration distance of not more than 60 inches
f. The system shall prevent the worker from contacting a lower level or object

6.2.2.3 Fall Arrest Subsystem and Components Requirements

All personal fall arrest equipment used shall meet the requirements of ANSI/ASSP Z359 Fall Protection Code. All equipment must meet the latest applicable Z359 product standard(s).

a) Anchorage System for Fall Arrest: Anchorage system consists of anchorage and anchorage connector:

1. Anchorage is the 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 for twice the maximum arresting force by the Qualified Person for Fall Protection (a secure point for attaching the fall arrest system). The 5,000-pound anchorage or 2 times the arrest force means the required anchorage for an active Fall Protection system, not the structure. Anchorages used for personal fall arrest shall be independent of any anchorage used to support or suspend platforms or loads.
2. Anchorage Connector is the terminus component of the active Fall Protection system, intended for attaching personal fall-arrest system to the anchorage. Anchorage connectors shall meet the requirements of the anchorage and shall withstand a force of 5,000 pounds. Wide varieties of anchorage connectors are available for use as part of a PFAS. Examples of anchorage connectors include but not limited to tie-off adaptor, beam clamps, roof anchors, self-locking eye connectors and ballasted anchors (Free Standing).

Note:

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

a. Tie-off Adapter. The tie-off adapter is a common component of a PFAS. The tie-off-adapter is, in essence, two “D” rings connected together by synthetic webbing or wire rope, typically with built-

in chaffing protection. The tie-off adapter allows personnel to improvise an anchorage by wrapping the adapter around a structural member of suitable strength. A lanyard or other components of the PFAS can then be attached to the tie-off adapter. Tie-off adapters can be found in three-, four-, and six-foot lengths. Additional lengths can be purchased.

When selecting a tie-off adapter as part of a PFAS, consideration must be given to potential misuse and inappropriate use. Anchorages have failed when the tie-off adapters were not attached to sufficiently strong structural members.

b. Other Examples of Anchorage Connectors below

Tie-Off Adaptor

Anchor Post

Force Management Anchor Post

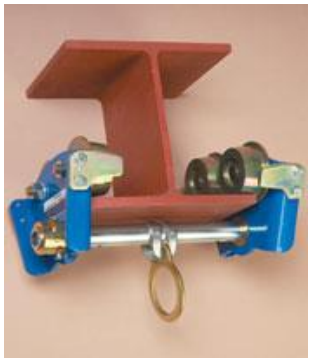
Beam Anchor

Permanent Anchor

Stanchion used for Steel Erection

Roof anchor

Swivel Roof Anchor



Beam Clamp

Anchorage connectors anchored into Concrete

Ballasted Anchor

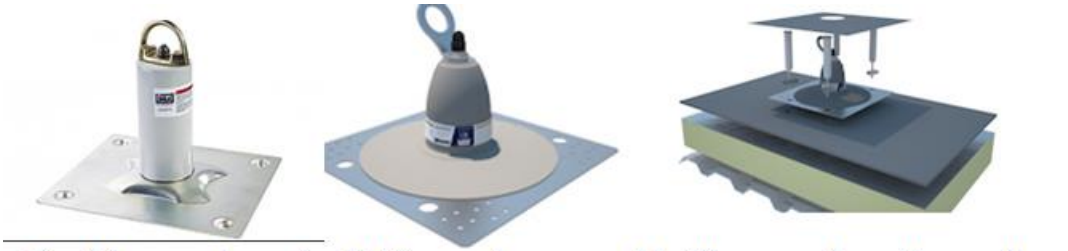
Anchorage connector for wood construction that spreads the fall forces on more than one rafter

Free standing Tripod used for confined space entry and retrieval

D-ring Anchor

Anchor Post

Beam Anchor



Roof top anchors for PVC membrane and built-up roofs, with weather proofing shroud

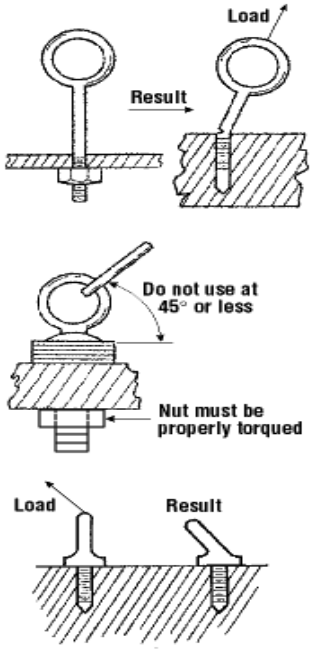
Permanent anchor for wood

Free Standing or Ballasted Anchor

Concrete Anchor

Tie Back Anchor

c. Eye Bolts
   1. A large eye-bolt made of the appropriate grade steel (forged steel) may serve as an acceptable anchorage connector
   2. The strength of an eye-bolt is rated along the axis of the bolt
   3. The strength of the eyebolt is greatly reduced if the force is applied at an angle less than 45 degrees to this axis
   4. **It is recommended that eye-bolts not be used for fall protection unless specifically designated by a Qualified Person for Fall Protection due to their loss of strength when not configured for use in the axial direction.**



d. Wire Form anchors

1. Wire form anchors are frequently used in tower construction, do not meet any ANSI standards, and are prone to failure due to improper use.

2. Do not apply side load to the anchorage connector (use in vertical application).
3. Wire form anchors are not recommended for use.

b) Connecting Means

Method or subsystem used to connect body support to the anchorage subsystem may include:

- Energy absorbing (shock absorbing) lanyard made of strap, webbing or rope
- Self-Retracting Devices
- Fall Arrestor is a rope grab or cable grab connected to a lifeline or rope lanyard

Energy Absorbing (EA) Lanyard: The EA lanyard as part of a PFAS connects the full body harness to an anchorage and reduces the forces of a fall through an integral shock absorber (deceleration device).

Lanyards are available in three, four, or six-foot lengths depending on the application, although longer lanyards are available (use-only in restraint systems). Lanyards must have snap hooks or carabineers and be designed for a PFAS. Commercial variations include adjustable EA lanyards that allow the lanyard to be shortened, reducing potential free fall distance. Variations also include EA lanyards with built-in chaffing protection and may include a "D" ring connector that allows a lanyard to be used to wrap around an anchorage. Double "Y" lanyards allow for 100% tie-off (i.e., one lanyard can always be connected to an anchorage). There are two types of energy absorbing single and "Y" lanyards. The first type is the six-foot free fall energy absorbing (single and "Y" lanyards) is only used when the anchorage point is located above the Dorsal D-ring. The second type is the 12-foot free fall single and "Y" lanyards used when the tie off point is below the dorsal D-ring.

When selecting a lanyard, consideration must be given to the availability and location of the anchorage point, free fall and total fall distance, potential chaffing and weight of the person, and capacity of the equipment. All newly purchased EA lanyards must be equipped with deployment indicators. Personal energy absorbers must be designed such that it is obvious if they have been activated or by a warning, flag, or label that indicates activation. Lanyards used in restraint systems and positioning lanyards can be either fixed or adjustable.

Best Practices:

1. The length of the lanyard used in fall-arrest shall not exceed 6 feet
2. The strength of the lanyard and the energy absorber shall be 5,000 pounds, minimum
3. The minimum diameter of a synthetic rope lanyard is 1/2 inch
4. Provide energy absorbers (shock absorbers) with lanyards (integral in-line is preferred)
5. Commercial variations include adjustable EA lanyards that allow the lanyard to be shortened, reducing potential free fall distance. Variations also include EA lanyards with built-in chaffing protection and may include a "D" ring connector that allows a lanyard to be used to wrap around an anchorage
6. There are two types of single and "Y" energy absorbing lanyards:
   a) **Six-foot <u>Free-Fall Energy-Absorbing Lanyard</u>:** 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 be no greater than 900 pounds (4 kN) under ambient dry conditions, and 1,125 pounds under ambient wet conditions without exceeding the maximum arrest force of 1,800 pounds (8 kN). The maximum deployment distance of the energy absorber shall be 42 inches.

Six-foot free fall energy absorbing lanyard

Do not tie the lanyard back to itself. A knot reduces the strength of the lanyard by 50% - 70%.

b) 12-foot Free-Fall Energy-Absorbing Lanyard: When an anchor point is located 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. When deployed during a fall, the average arresting force on the body shall be no greater than 1,350 pounds (6 kN) under ambient dry conditions, and 1,575 pounds under wet conditions without exceeding the maximum arrest force of 1,800 pounds. The maximum deployment distance of the energy absorber shall be 60 inches. The 12-foot FF energy-absorbing lanyard shall be used when the tie-off point is located below the dorsal D-ring.

Note:

A 12-foot FF energy-absorbing lanyard does not refer to the lanyard length. Instead it refers to a free-fall distance that is greater than 6 feet (up to 12 feet), which is created by the anchor point´s being located below the dorsal D-ring (at the foot level). The maximum lanyard length shall not exceed 6 feet. Always refer to equipment labels and manufacturer's instructions, restrictions and recommendations).

Note:

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

7. A lanyard strap shall not be wrapped around a tie-off point and then attached back to it-self
8. The snaphook shall only be attached to an integral D-ring (incorporated into the full body harness by the manufacturer)
9. All energy absorbers 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 a 6-foot FF EA lanyard shall have white background with black lettering and the 12-foot FF EA lanyard shall have black background with white lettering

Energy Absorbing Lanyard Labels

10. It shall be recognized that synthetic rope and nylon strap lanyards are more elastic than Kevlar or wire rope lanyards which means they will generally have more stretch.
11. The activation force required to deploy the energy absorber shall be less than 450 pounds.

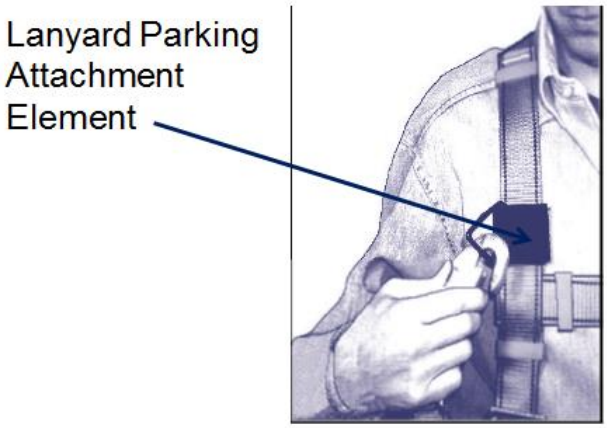
Note:

All newly purchased single and "Y" energy absorbing lanyards used shall be equipped with at least one Deployment Indicator. Personal EA must be designed such that it is obvious if they have been subjected to arresting forces by a warning, flag, or label that indicates activation.

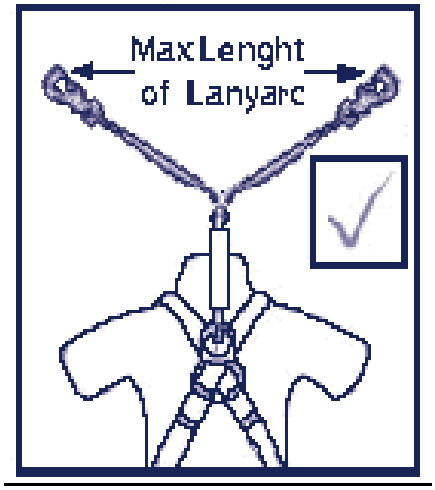
"Y" Lanyards

Warnings when using "Y" Lanyards

a. 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 (parking Location), especially the "Y" lanyard having a single common energy absorber.



b. Do not allow the legs of the lanyard to pass under arms, between the legs, or around the neck of the end-user.
c. Do not connect the energy absorber of the "Y" lanyard to the anchorage; connect only to the dorsal D-ring.
d. Do not use a 6-foot FF energy-absorbing "Y" lanyard if the free-fall (FF) distance is greater than 6 feet.

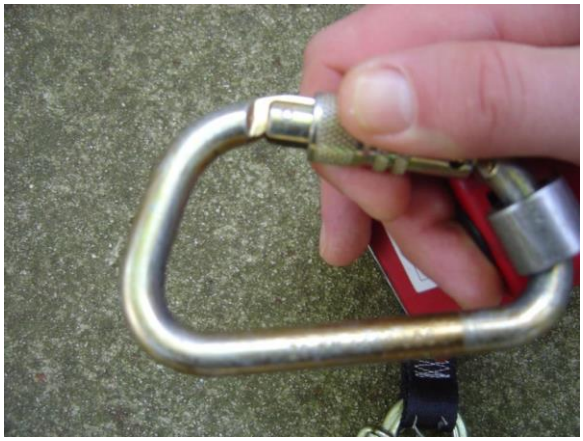


b) Snaphooks and Carabiners:

1. Shall have a minimum strength of 5,000 pounds.
2. The gate must withstand a minimum force of 3,600 pounds when applied in any direction, and shall meet the requirement of ANSI Z359.12 Standard.
3. Snaphooks and carabiners shall be sized to be compatible with the connectors to which they are connected. Compatible connections will prevent unintentional disengagement.
4. Snaphooks and carabiners shall be self-closing and self-locking, requiring to be opened by at least two consecutive deliberate actions. The non-locking types are prohibited.

Compliant snaphooks and carabiners shall be engraved with the words "3,600 pounds", denoting the gate strength.

Locking Snaphooks



Carabiner

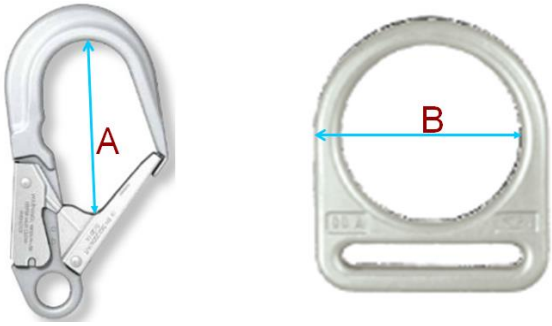
Correct Connection

Wrong Connection

Wrong Connection

c) Hardware Compatibility

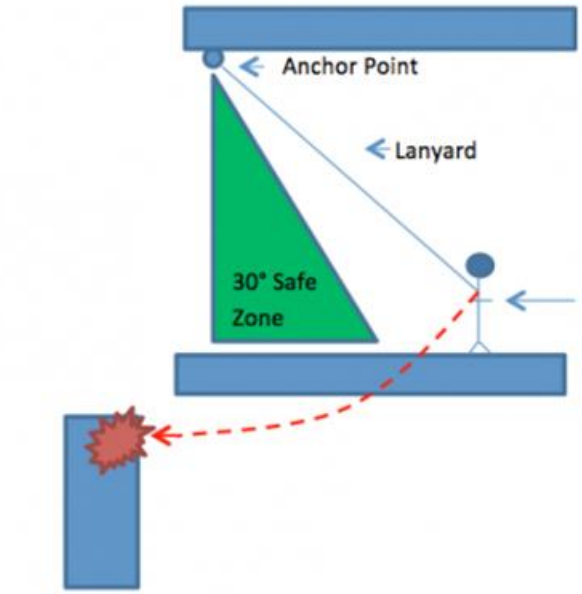
1. Hardware compatibility is the relationship between components (i.e., snaphook and D-ring). The snaphook shall be sized so that the gate is protected and should not be opened by the D-ring itself.
2. Using locking snaphook or carabiner does not assure compatibility
3. Compatibility is achieved when dimension **"A" is less than "B"** below. The snap hook will self-correct in the event of a fall.



d) Swing Fall Hazards

Swing fall is what occurs when a person wearing a PFAS that is not anchored directly overhead. If a fall should occur, the person will swing, like a pendulum, back toward the anchor point. In the process, the

person could strike – with great force – the structure he or she is working on or another nearby structure. Swing falls can be extremely dangerous. Unfortunately, many people, when working at heights, fail to take into consideration the swing fall hazards



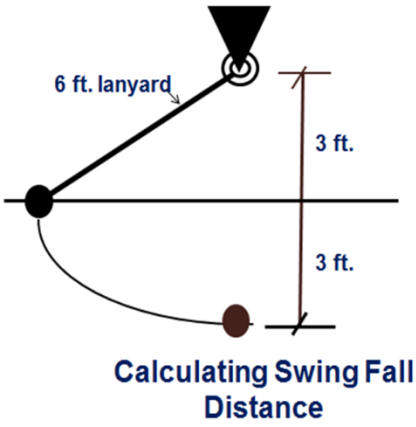
Recommend wearing a helmet with chin strap

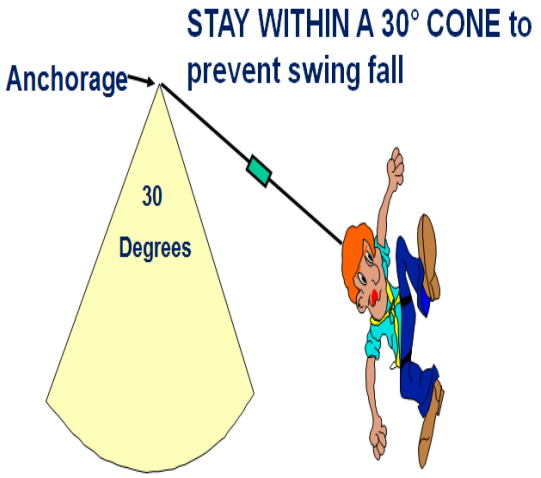
The above diagram depicts just one scenario. The person certainly could be working in an area where there is no other structure to strike. Even if this is the case, there are still hazards to working outside of that 30° safe zone. If the working level is 12 feet off the ground, during work the person wanders 20 feet away from the anchor point – well outside the safe zone, if a fall occurs in this situation the person may not hit another structure, but WILL hit the ground below. Self-retracting devices or lanyards do not recoil during a fall; they just lock. The entire 20 feet of lanyard will remain played-out and the person will strike the ground.

This is a very real problem. Most people don their harness and lanyard and give little thought to their Fall Protection. They payout the lanyard as far as they can in any direction they need to go, completely unaware of the swing hazard until it is too late.

e) Preventing Swing Fall Hazards

The only way to prevent swing fall is to stay within a certain distance of the anchorage. The tie-off point should be located above the dorsal D-ring. Swing falls can be prevented by staying within a 30° of the anchorage. The further the person moves away from the anchorage, the further the swing and the harder the strike at structure.





f) History of SRL/SRD's

ANSI/ASSP Z359.14 was first published in 2012 and included historical requirements previously established in ANSI/ASSP Z359.1-1992 (R1999) and ANSI/ASSP Z359.1-2007. Additional requirements were developed for devices of different types; specifically, self-retracting devices with integral rescue capability (SRL-R) and self-retracting devices with leading edge capability (SRL-LE).

The requirements for SRL-Rs were largely extracted from ANSI/ASSP Z359.4-2007, while the requirements for SRL-LEs were new developments, inspired by existing data and procedures developed by international organizations exploring this issue. Since the publication of the ANSI/ASSP Z359.14-2012 standard, personal self-retracting devices have proliferated considerably, as have SRL-LEs. Additionally, these two classifications have merged, and personal SRL-LEs have become a very highly influential component of commonly utilized personal fall arrest systems. As a result, it has become clear that a more focused set of requirements have become necessary to ensure higher factors of safety are achieved in this highly influential class of product.

These products and the practice of foot-level tie-off is controversial due to the increased risk of injury to the users of such equipment as a result of likely contact with the structure or structural edge as well as the considerable increase in fall clearance required.

In an effort to focus users of these devices on the most effective practices relative to fall arrest, ANSI redefined the types and classes of these devices and has established more stringent requirements for all self-retracting devices with the objective of increasing overall factors of safety.

Current ANSI SRD requirements:

On June 17, 2021, ANSI approved the new 2021 revision of Z359.14, Safety Requirements for Self-Retracting Devices (SRDs) for Personal Fall Arrest and Rescue Systems. This revision supersedes the 2014 version and went into effect on August 1, 2023. In the previous 2014 revision of Z359.14, SRDs were organized by type (SRL, SRL-R for devices with rescue/retrieval functions, or SRL-LE for leading edge capability) and class (Class A or Class B). The intent was to organize SRDs by features in "Type" and then by their overhead performance capability by "Class."

Both types and classes were overhauled in 2021: "types" are SRL, SRL-P for personal devices meant to be installed on the user's full body harness, or SRL-R for devices with rescue/retrieval functions, and "classes" are Class 1 or Class 2. The SRD class is now applied

to acceptable anchorage locations. Class 1 devices are suitable for at or above dorsal D-ring anchorage locations. Class 2 devices are suitable for above, at, or up to 5 feet below the dorsal D-ring anchorage locations AND must be leading edge rated. So, if your jobsite has edge exposures and you need a leading edge SRL or SRL-LE, you will be looking for a Class 2 device in compliance with ANSI/ASSP Z359.14-2021!

With the type and class changes, Z359.14-2021 also introduced standard overhead performance criteria for all SRDs and standardized class labeling. Now, a worker will be able to quickly identify the suitable device for the hazards faced in their work zone.

In the 2012 and 2014 revisions of Z359.14, overhead performance criteria were defined by SRD class: Class A or Class B. In 2021, overhead performance was standardized across all SRDs. In addition to the Class 1 and Class 2 standard labels, all Class 2 SRLs must include a full fall clearance table or diagram as part of the physical product and the user instruction manual. This provides critical clearance information directly on the product, where it is most easily accessible by the end user or Competent Person at the place and time of use.

ANSI/ASSP Z359.14-2021 went into effect on August 1, 2023. The older Class A and Class B devices can continue to be used until they reach the end of their lifecycle, at which time they should then be replaced with the new Class 1 or Class 2, as appropriate (no need to go out and replace everything right now unless the type of use of the device necessitates a change).

At a high level, the 2021 changes to the ANSI Z359.14 standard are designed to:

1. Simplify types and classes of SRDs so end users can quickly identify a compliant product's capabilities.
2. Increase factors of safety on multiple components and tests.
3. Introduce a new testing regime for personal SRDs or SRL-P's (those worn on the back, connected to the full body harness), including specific tests to address product issues that led to a manufacturer recall.
4. Further standardize labels and markings to make clear an ANSI compliant product's capabilities.

g) Self-retracting Device classes

Class 1. Self-retracting devices which shall be used only on overhead anchorages and shall be subjected to a maximum free fall of 2 feet (610mm) or less, in practical application.

Class 2. Self-retracting devices which are intended for applications wherein overhead anchorages may not be available or feasible and which may, in practical application, be subjected to a free fall of no more than 6 feet (1.8m) over an edge.

Note. Before a device may be qualified according to the requirements of Class 2, it shall first meet the requirements of Class 1.

h) Self-retracting Devices (SRDs)

SRDs are deceleration devices made of synthetic rope, webbing or wire rope.

1. There are four types of SRDs:
   a. Self-retracting Lanyard (SRL)
   b. Self-retracting lanyard with Leading Edge Capability (SRL-LE)
   c. Self-retracting Lanyard with Rescue Capability (SRL-R)
   d. A hybrid combination of any two of the above.

Note:

Self-Retracting Devices shall be equipped with a visual indicator, which shall be readily visible.

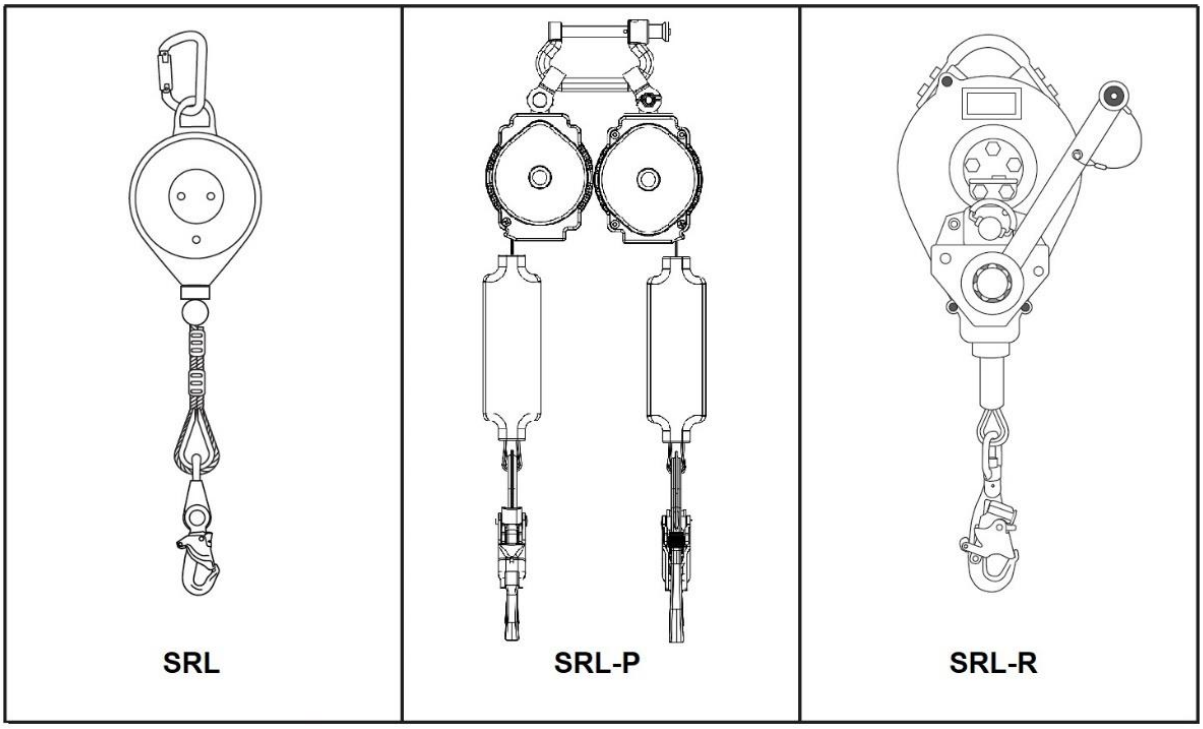
i) SRD Classifications:

1. **SRDs are classified according to dynamic performance.**
   a. Class A: Maximum Arrest Distance -- 24 inches
   b. Class B: Maximum Arrest Distance -- 54 inches

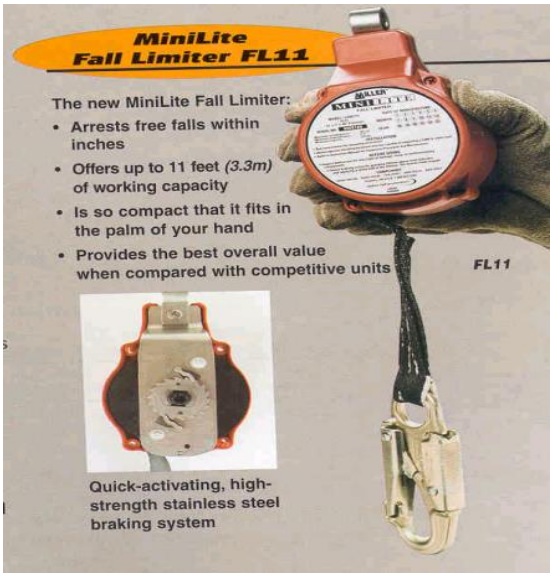
2. **Self-Retracting Lanyards (SRL):** The self-retracting lanyard (SRL), also known as a self-retracting lifeline, refers to a wide variety of commercially available devices. An SRL is a device containing a drum-wound line or strap. This line can be slowly extracted from, or retracted onto the drum under slight tension during normal employee movement. After onset of a fall, the line automatically locks the drum and arrests the fall. The SRL is attached to a suitable overhead structural member. A locking snap hook at the end of the webbing or wire rope is attached to the dorsal "D" ring. The mechanism works in a manner similar to a retractable automobile seatbelt. The SRL comes in lengths from a few feet to an excess of a hundred feet in length. SRL advantages include a self-tending lifeline and reduced free fall distance. Disadvantages include high cost, weight of the equipment, requirement for specialized inspections, and the possibility of swinging into an obstruction during a fall if the SRL is extended too far horizontally.

Best Practices:

1. The maximum arrest distance shall be as follows:
   a. Class A – 2 feet
   b. Class B – 54 inches
2. Average arrest force on the body shall not exceed:
   a. Class A -- 1,350 pounds
   b. Class B – 900 pounds
3. The maximum peak force shall not exceed 1,800 pounds.
4. The SRL is typically used in a vertical mode unless permitted by the manufacturer for horizontal application

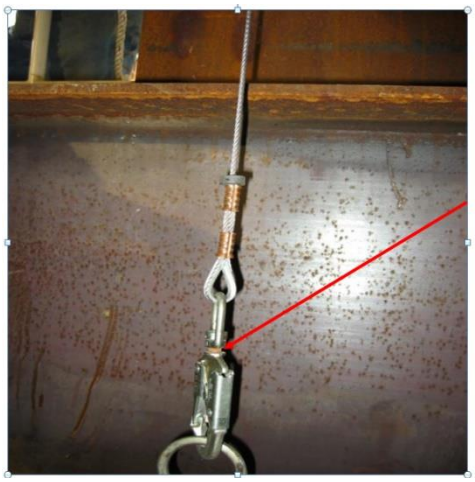


Examples of Self-Retracting Devices
(reference only)



Self-Retracting Lanyard

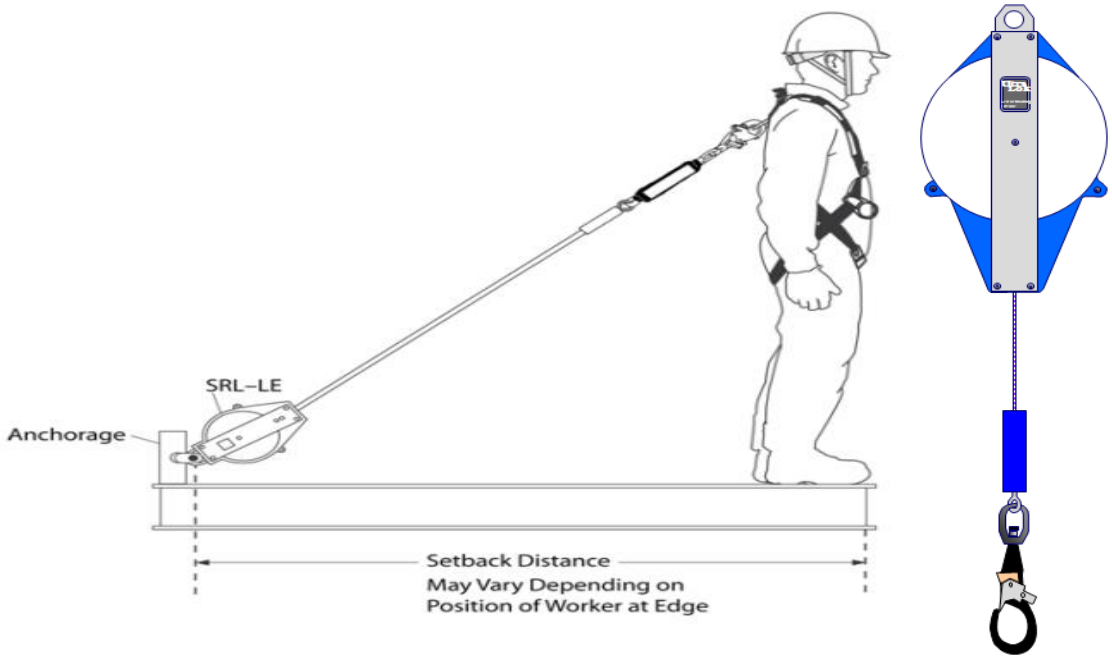
5. The SRLs shall meet the requirements of ANSI Z359.14 Standard.
6. Used when the tie off point is located below the dorsal D-ring.
7. SRL shall be equipped with deployment indicator.



• Red ring is a fall indicator – SRL has been impacted by a fall and must be removed from service

3. **Self-Retracting Lanyards with Leading Edge Capability (SRL-LE):** A SRL-LE is suitable for applications where during use the device is not necessarily mounted or anchored overhead. The device may be at foot level and where the possible free fall is up to 5 feet that includes an integral energy absorber adjacent to the end of the which connects to the Full Body Harness to withstand impact loading of the line constituent with a sharp or abrasive edge during fall arrest and for controlling fall arrest forces on the End User. The SRL-LE can be used in horizontal or vertical applications. The line constituent of SRL-LE is made of either of synthetic rope, webbing or wire rope. SRL-LE shall meet the requirements of ANSI Z359.14 Standard.

a. Requirements:
   1. FF distance is 5 feet
   2. The Arrest distance limit do not apply to SRL-LE
      a. Class A, average arrest force = 1,575 pounds
      b. Class B, average arrest force – 1,125 pounds
   3. SRL-LEs do not necessarily need to be Class A or B but Class B is more common. These are designed and manufactured for steel erection and it is dangerous for use on other surfaces (i.e. concrete) serrated knife. Many manufacturers are having issues with SRL-LE. Using SRL-LE should be the last method selected and used, even a horizontal lifeline system would often times be safer than SRL-LE.
   4. Equipped with energy absorber which is 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 W/Leading Edge Capability

4. **Self-retracting Lanyards with Rescue Capability (SRL-R):** An SRL that includes an integral means for assisted rescue via raising or lowering the rescue subject. SRL-R must be capable of raising or lowering the load to affect rescue. The device can be made as part of a SRL or SRL-LE as a hybrid component.
    a. Minimum static strength of 3,000 pounds
    b. Minimum mechanical advantage of 3:1

5. **Hybrid Self-retracting Devices:** Combination of two types of the above Self-retracting Devices.
6. **Line Characteristics of Self-retracting Lanyards:**
    a. Synthetic rope or webbing: shall have a minimum breaking strength of 4,500 pounds (20kN)
    b. Wire Rope: shall have a minimum breaking strength of 3,400 pounds (15 kN).
    c. Minimum diameter of the line constituent shall be 3/16 inches.

j) Fall Arresters: A Fall Arrester is a device that travels on a rope or cable and automatically engages the line and locks to arrest the fall of a worker. The fall Arrester is a very useful component of a PFAS when vertical mobility is required. When the rope grab is designed to manually lock, it may be used in a horizontal mode as part of a fall restraint system, which is called rope adjuster. Fall Arrester is also used to attach a worker to a climbing ladder fall arrest system using a short connector.

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

1. 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 the device). The fall arrester is a very useful component of a PFAS when vertical mobility is required

2. When the rope grab is designed to manually lock, it may be used in a horizontal mode as part of a fall restraint and positioning system, which is called rope adjuster.

Fall Arresters

k) Body Support (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. Full Body Harness is a fundamental component of every PFAS. All full body harnesses shall permanently incorporate a dorsal attachment element (D-ring), and may contain any combination of other elements and must permanently include a load bearing sub-pelvic strap. All shoulder straps must come together at the dorsal location and either cross or be connected by webbing or attached with a connector. The Full Body Harness must permanently incorporate either a waist belt or back strap, or other means of controlling the separation of the shoulder straps on the back of the Full Body Harness. The harnesses are either equipped with a chest strap that horizontally connects two vertical shoulder straps or shoulder straps that cross at the chest (X-Style). Full body harnesses used in fall arrest may also be integrally designed into coveralls or vests. An extender element no longer than 24 inches may be used as attachment to the dorsal D-ring. Fundamentally, full body harnesses meeting the requirements of ANSI Z359.11 Standard have the following common characteristics:

1. **Types of Harnesses**
   a. **Vest Style Harnesses (three Types):**

(1) Equipped with Chest Strap, Sub-Pelvic Strap and Back Strap

(2) Equipped with Chest Strap, Sub-Pelvic Strap and without Back Strap

(3) Equipped with Chest Strap, Sub-Pelvic Strap and Waist Belt

b. Cross Over Style Harness (X Harness):

Equipped with Sub=Pelvic Strap

c. Y –Style Harness (Used for Rope Access):

Y Style Harnesses shall be equipped with both Frontal and Sternal D-rings, with Integral Waist Belt and Leg loop suspension straps attached to waist belt (2 at the front and 2 at the back) and without Pelvic Strap.

2. **Full Body Harness Selection:** Consideration must be given to the following items when selecting the appropriate full body harness:
   a. Expected duration that personnel will be wearing the body harness.
   b. Body stature and size of personnel assigned (one size does not fit all).
   c. Gender of personnel expected to wear the harness.
   d. Type of work being performed.

3. **Full Body Harness Best Practices:**
   a. Maximum arresting force on the body shall not exceed 1,800 pounds
   b. 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
   c. Shall have permanently attached labels stating the manufacturer's name, serial number or lot number, date of manufacture, capacity, annual Competent Person for Fall Protection inspection, and that it meets OSHA & ANSI Z359 FP Code/Product Standards requirements.

d. The capacity range, including weight of the user, clothing, and tools, shall be from 130 to 310 pounds.
e. All Straps must be connected together properly. Load bearing straps shall be minimum 1 5/8 inch wide.
f. Conduct a buddy check to make sure the harness is properly donned and connected.
g. All newly purchased harnesses shall be equipped with fall-arrest indicator for the Dorsal D-ring and at least one lanyard parking attachment element having a disengagement load of not more than 120 pounds (Required for attaching the unused leg of the "Y" lanyard to the harness) and may include a back strap.

l) Lineman's Equipment: (Use electrically rated harnesses meeting ASTM F887 and ANSI Z359 FP Code/Standards). The full-body harness used around high voltage equipment or structures shall be an industry-designed "lineman's FP harness" that will resist arc flashing and either shall have 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 linemen's harnesses shall also be plastic coated (e.g., buckles and adjusters). There shall be no metal above the waist or equipped with insulated metal components.

(Utility harness) Arc Flash Harness
(There is no metal above the waist)
or equipped with insulated Metal Components

m) Criteria for donning of the full-body harness:

1. It is very important and critical the harness shall snugly fit the body
2. The user shall be able to reach the Dorsal D-ring with his or her thumb
3. There shall be a maximum four flat fingers of slack between the legs and the leg- straps
4. Ensure that the chest strap is across the chest/breast bone.

n) D-rings and Connectors

1. Requirements:
   a. Shall have a minimum tensile strength of 5,000 pounds.
   b. Shall be drop forged, pressed, or formed steel.
   c. Connectors and D-rings shall have corrosion resistant finish.

d. Connectors, adjusters and any buckles used as adjusters shall be capable of withstanding a minimum load of 3,372 lbs. (15 kN) and shall be made of drop forged, pressed or formed steel, or made of equivalent materials.

2. D-ring locations on the full body harness and uses:
   a. Dorsal "D" ring located at the upper back between the shoulder blades. (Note: In addition to fall arrest, the dorsal attachment may also be used in travel restraint and rescue systems.)
   b. A frontal "D"- ring attachment located at the waist for use as a ladder climbing connection for guided type fall arresters where there is no chance of a fall in a direction other than the feet first. The frontal D-ring is also used in suspended rope access system, work positioning, travel restraint and rescue
   c. Hip D- rings attachment element, located at the side near the hip region, must be used in pairs and must be used solely for work positioning or travel restraint (Note: The hip D- ring attachments are not to be used for fall arrest.)
   d. Shoulder D- ring attachment elements must be used as a pair, and are acceptable attachment for rescue and entry/retrieval. These "D" rings are located at the top of each shoulder strap and are usually smaller in size than the dorsal "D" ring. (Note: The shoulder attachment elements must not be used for fall arrest but can be used for confined-space rescue).
   e. Sternal D- ring. The sternal attachment is located at the sternum. It may be used as an alternative fall arrest attachment in applications where the dorsal attachment is determined to be inappropriate by the Competent Person for Fall Protection and where there is no chance to fall in a direction other than the feet first. The sternal attachment should only be used when the likely fall distance is not greater than two feet. Accepted practical uses for a sternal attachment include ladder climbing with guided fall arrester, ladder climbing with an overhead self-retracting lifeline for fall arrest, work positioning, travel restraint, rescue and rope access.
   f. Waist, Rear. The waist, rear attachment shall only be subjected to minimal loading through the waist of the user and shall not be used to support the full weight of the user. (Note: the waist rear shall only be used for travel restraint).
   g. Saddle (pairs). Used with suspension seat and shall be used only for work positioning.

3. **Other Accessories:**
   a. Waist belts, depending upon the design, may be integral to the full body harness and necessary for proper use**;** or simply a convenience for attaching tools, carrying pouches, or providing lower back support.
   b. Shoulder pads (used in pairs), leg padding, integral elastic webbing, and a wide variety of other features that add commercial viability to products.

o) Integrated Equipment Used with the Harness: Include Vest, Suspension Seat, Extender, Dorsal or other specialized attachment elements.

- **Extenders**
  - Extender is a short extension designed to be attached to the dorsal D-Ring of harness (No longer than 24 inches).
  - Makes it easier for End User to grab extension and snap on retractable.

p) All newly purchased full body harnesses shall be equipped with two Suspension Trauma Preventers (straps) such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance. Most of the newly manufactured harnesses may already be equipped with these straps.

<u>Note</u>:

These straps are safety devices that will help under ideal conditions. They cannot be solely relied upon; the Competent Person for Fall Protection may require other rescue alternative. There might be

a situation where an injury or medical condition occurs before or during the fall, incapacitating the employee suspended in the full body harness, thus not allowing the use of the suspension trauma step-in safety strap. In this situation, the rescue plan shall include requirements for additional rescue and evacuation procedures.

q) Ropes:
Requirements:
a. Synthetic rope lifelines: minimum strength of 5,600 pounds
b. Wire rope lifeline: minimum strength of 6,000 pounds
c. Vertical lifelines: minimum strength of 5,000 pounds

6.2.3 Other Active Fall Protection Systems

6.2.3.1 Flexible Horizontal Lifeline (HLL) System

A horizontal lifeline (also called catenary line or static line) is a fall-arrest system, consists 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 which moves horizontally on the horizontal lifeline. A horizontal lifeline is used to control dangerous pendulum-like swing falls**. A Qualified Person for Fall Protection** must design the system. The Competent Person for Fall Protection may supervise the assembly, disassembly, use and inspection of the HLL systems, under the direction of the QP.

The HLL shall be designed, installed, certified, and used under the supervision of a Qualified Person for Fall Protection, as part of a complete fall-arrest system, which maintains a safety factor of two. Horizontal lifelines can be either permanent or temporary systems.

a. Design Considerations for Flexible Horizontal Lifelines:
   1. Certain parameters should be taken into consideration when designing horizontal lifelines, such as:
      a) Initial and maximum deflection or sag of the line.
      b) Clear span between supports or anchorages.
      c) Design of anchor points and anchorage connectors.
      d) Number of workers attached to the system.
      e) Free-fall distance and total fall distance.
      f) Minimum clearance below horizontal lifeline system.
      g) Unit weight of the cable and the line.
      h) Total weight of all workers attached to horizontal lifeline.

HLL

b. The components of typical Horizontal lifeline sub-system may include the following:
   1. Anchorages and anchorage connectors.
   2. Lifeline tensioner.
   3. Cable or rope.
   4. In-line energy absorber
   5. Mobile attachment device

c. There are two types of HLL systems, classified according to their method of installation:

1. Type 1: Flexible HLL system that is designed by the manufacturer, installed by the purchaser of the system or their representative, and used in accordance with manufacturer's requirements.

2. Type 2: Flexible HLL system is designed and installed by the manufacturer (certified installer of the system) and used by the purchaser of the system (or their representatives) in accordance with manufacturer's requirements.

d. ANSI is developing a new horizontal lifeline standard. Verification testing requirements may include the following tests:

1. Line fittings static test
2. Corrosion Inspection

Unfortunately, with a factor of safety of two, many tests have the potential to activate the lifeline system. Careful consideration is required in determining testing requirements.

e. Additional Best Practices

1. Locally manufactured HLLs are not acceptable unless they are custom designed for limited or site-specific applications by a registered professional engineer who is also qualified in designing HLL systems.

2. Commercially manufactured HLLs shall be designed, installed, certified and used under the supervision of QP for FP only, as part of a complete fall-arrest system. The CP for FP may (if deemed appropriate by QP for FP), supervise the assembly, disassembly, use and inspection of the HLL systems, under the direction of the QP for FP.

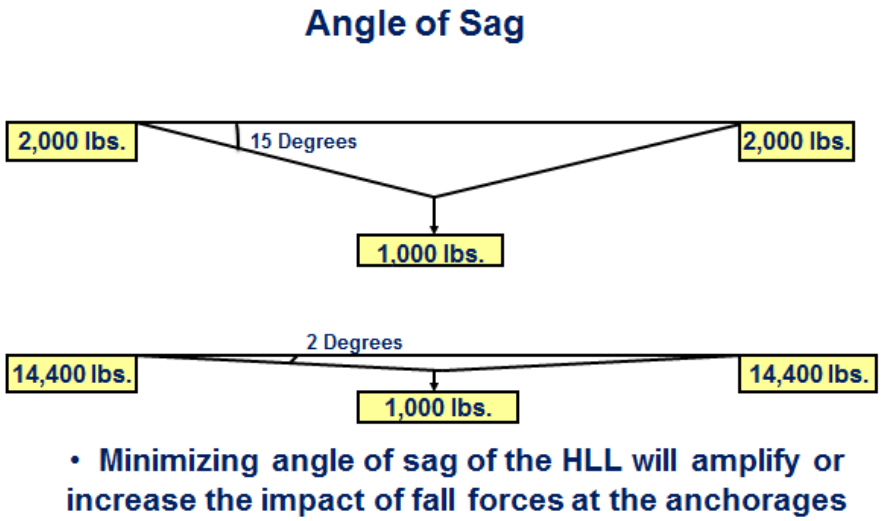
3. The design of the HLL shall include drawings, required clearance, instructions on proper installation, and use procedures, proof testing reports and inspection requirements.

4. All HLL anchorages shall be designed by a Registered Professional Engineer who is also qualified in designing HLL systems.

5. The factors that should be taken into consideration for calculating the minimum required clearance for HLL systems include free-fall distance, initial sag of the line, maximum dynamic deflection, length of the lanyard or lifeline, activation distance, of self-retracting lanyards, deployment of energy absorbing lanyards, harness stretch and a safety margin.

Note:

Depending on the angle of sag and the line's elasticity, the forces generated by a fall are greatly amplified at the anchorages.



6.2.3.2 Rigid Horizontal Rail System (RHRS)

The RHRS is a Fall Protection system that uses one or more mobile attachment devices on a horizontal track system and can be either single- or multi-span supported at intermediate points along the length.

a. Pre-engineered and manufactured system.
b. Shall only be designed under the supervision of a QP.
c. Installation, use and inspection of RHRS may be performed by CP under QP supervision.
d. Examples of the RHRs included monorails, bridge and runways swing arms, and folding monorails supported by existing roofs, ceilings, walls, columns, building facades or freestanding, movable free standing or ballasted free standing.
e. The system may consist of horizontal track system, anchorage connectors, intermediate anchorages and mobile attachments.
f. The mobile attachment device may also travel on the outside or the rail such as an I-beam or other structural shaped slotted tube. The RHRS is designed and only installed by the manufacturer (certified installer) and used by the purchaser of the system (or their representatives) in accordance with manufacturer's instructions and requirements.


Rigid Horizontal Rail Systems

6.2.3.3 Single Anchor Lifeline System

a. A single anchor lifeline is a suspended line attached to a fixed anchorage independent of the walking/working surface to which a lanyard or device is attached. When single anchor lifelines are used, each employee shall be attached to a separate lifeline. There shall not be more than one worker attached to a lifeline. Each worker requires his/her independent lifeline

b. Single Anchor Lifelines shall be protected from sharp edges, and against being cut or abraded by using chafing material

c. The system consists of a fall-arrester attached to a lanyard, which is connected to a harness, and designed to move up or down a lifeline (synthetic or wire rope)

d. Single anchor lifeline can be used in vertical, sloped or horizontal applications.

Single Anchor LL

e. System Requirements:
   1. Shall have a minimum breaking strength of 5,000 pounds
   2. Connected to an overhead anchorage that can withstand a force of 5,000 pounds.

f. Types of Ropes used in Single Anchor Vertical Lifeline Systems:
   1. Synthetic Rope:
      a) Made of Polyester, Polypropylene or Nylon
      b) Man-made yarns, fibers or filaments
      c) Minimum breaking strength of 5,600 pounds
   2. Wire Rope:
      a) Drawn wires forming strands laid helically over a core or axis;
      b) Minimum breaking strength of 6,000 pounds;
      c) Minimum diameter of 5/16 inch.
   3. Automatic Fall Arresters used in Single Anchor LL and Descending
      a) Applications - A fall arrester is a device that travels on a rope or cable and automatically engages the line and locks to arrest the fall of a worker. The fall arrester is a very useful component of a PFAS when vertical mobility is required. When the rope grab is designed to manually lock, it may be used in a horizontal mode as part of a fall restraint system, which is called rope adjuster. Fall arrester is also used to attach a worker to a climbing ladder fall arrest system using a short connector.
      b) Requirements:
         1. Average arrest force on the body shall not be greater than 900 pounds
         2. Maximum arrest force shall not exceed 1,800 pounds
         3. Maximum arrest distance shall not exceed 54 inches
         4. Shall be automatic in their locking
         5. The total fall distance shall not be greater than 11 feet
         6. The FA shall not creep more than 4 inches on the rope during a fall.
      c) Proper Usage:
         1. If the FA has directional arrow on it, make sure it is pointing along the lifeline to the anchorage. The gravity feed latches prevent the worker from accidentally placing the FA incorrectly on the lifeline

2. After mounting on the lifeline, check to ensure the fall arrester is working properly by pulling down sharply

3. During a fall, the user may grab on the FA and inadvertently hold it open, the new fall arresters will be equipped with panic grab; even when the user holds the FA open, it will self-lock and arrest the person automatically.

4. Fall arresters are designed to work with certain types and diameter of ropes or cable

5. Use only automatic travel fall arresters in vertical or descending applications.

6. Fall Arrester and the rope/cable must be compatible.

7. Make sure the appropriate size and type of lifeline is used. The required size is marked on the fall arrester.

6.2.3.4 Climbing-Ladder Fall Arrest System (Ladder Climbing Device System)

A vertically oriented system consists of an assembly of components whose function is to arrest the fall of a user. The system includes a flexible or rigid carrier, and its associated mounting brackets, and the carrier sleeve. The carrier is securely attached to the climbing ladder or to the immediately adjacent structure. The system must permit the employee wearing a full body harness to ascend or descend without continually having to hold, push or pull the carrier sleeve, leaving both hands free for climbing or descending.

Climbing Ladder FA system is installed on fixed ladders over 24 feet in length. The 24 feet is the length of the climb (does not include side rail extension of 3 1/2 feet.).

a. The carrier is made of rigid rail, cable, or rope

b. Anchorage strength requirement is 3,000 pounds

c. Free-fall distance shall not exceed 2 feet

d. The connector from the frontal D–ring to the tie-off point on the ladder (rope or cable grab) shall exceed 9 inches long

e. Make sure the ladder is adequate for attaching the climbing-ladder fall arrest system to it due to the high forces generated by a fall. If a fall occurs, the ¾-inch rungs will not sustain the forces imposed on the ladder; specifically, when a cable is used as part of the climbing system

f. Attachment point to the body harness shall be either to the sternal or frontal D-rings. Consult the manufacturer for the proper connection point

g. There shall be 100% transition at the top of the ladder. Examples include, but are not limited to, top of ladder approved anchor points, handholds or grab bars, guardrails, flared (walk-through) side rails, and self-closing swing gates

h. Flexible carrier shall not be longer than 40 feet.

6.2.3.5 Restraint System

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. A safety harness (full-body harness) attached to securely rigged restraint lines;

b. According to OSHA Subpart M, anchorages used for restraint shall withstand a minimum force of 3,000 pounds unless engineered. According to ANSI Z359.2 Standard, the selected restraint anchorages shall be capable of sustaining a 1,000-pounds static load (non-certified anchorages), twice the foreseeable force for certified anchorages or as determined in accordance with ANSI Z359.6 standard. Keep in mind OSHA is the law.

c. The restraint system shall be rigged to allow the movement of employees only so far as the sides and edges of the walking/working surfaces. The person shall not be exposed to a fall hazard;

d. 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 (using self-retracting lanyard with leading edge capability).

e. 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. According to Z359.6 Standard, section 4.5.2 states the following: SRDs may be used in travel restraint systems, providing the total deployment length of the lanyard constituent including the reserve line, does not permit the user to reach and be exposed to a Fall Hazard.

f. When using flexible anchorage system such as a horizontal lifeline system as part of a restraint system, pay special attention on how short the lanyard or lifeline needs to be in order that the worker will not reach a Fall-Hazard condition.

g. The lanyard length used in restraint system can be longer than 6 feet.

h. There are two types of restraint lanyards:

a) Type A - Non Adjustable

b) Type B – Adjustable.

Note 1:

The terms *Restraint System*, *Travel Restraint*, *Fall Restraint*, *Work Restraint* and *Travel Restriction*, used and referenced in the ANSI Z359 Fall Protection Code/Standards are the same.

Note 2:

It is highly recommended to design or select anchorages for the restraint system as if they were fall-arrest anchorages. It is also recommended that energy-absorbing lanyard be considered and used as part of the restraint system. These precautions would provide some level of protection, in the case of system misuse.

Restraint System

6.2.4 Other Fall Protection Systems

6.2.4.1 Positioning System

The system consists of body harness and a short lanyard attached to a vertical work surface. Although allowed by OSHA, the ANSI Z359 FP Code/Standard and OPNAV M-5100.23 Chapter 13 do not permit the use of a body belt by itself; at a minimum, the body belt shall be incorporated into full body harness.

a. System Requirements:

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

Note:

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

Positioning System

6.2.4.2 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 shall be erected not less than six (6) feet from the edge of the roof. When mechanical equipment is being used, the warning line shall be erected not less than six feet from the roof edge which is parallel to the direction of mechanical equipment operation. The warning line shall be not less than 10 feet from the roof edge perpendicular to the direction of mechanical equipment operation. OSHA considers the use of a warning line system a *De-Minimis* violation of the guardrail criteria.

Warning lines shall have the appropriate OSHA compliant flag attached to them.

Warning Line System

a. For roofing work:

1. The line is installed six to ten feet away from a leading edge, and flagged every 6 feet; provide signage stating “warning line.”

2. Shall consist of a rope, wire, or chain, and supporting stanchions.

3. A safety person, whose sole job is observation and ensuring a safe working environment, shall be present

4. On minimum-sloped surfaces, the line shall be erected 15 feet from the unprotected roof edge.

b. For other construction trades working on roofs:

1. The line shall be installed 15 feet away from the edge of the roof. Other requirements for warning line system are the same as for roofing work.

6.2.4.2.1 Warning Line System Requirements

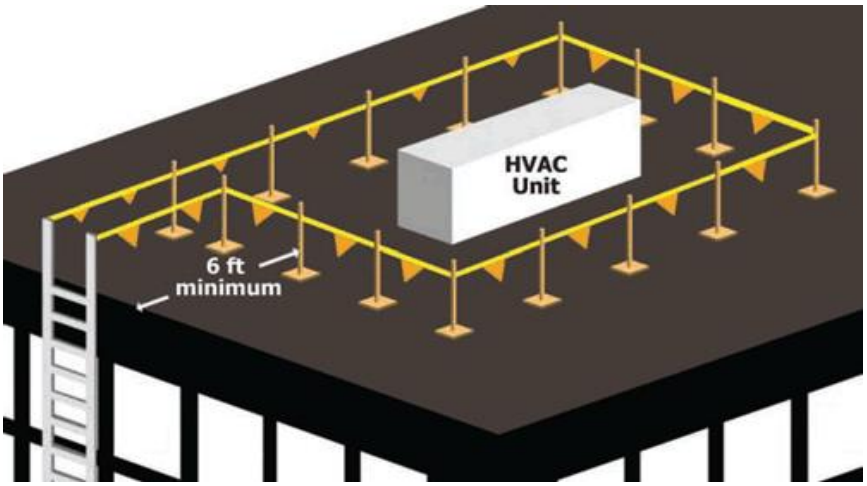
a. The line consists of rope, wires or chains, 34 to 39 inches high, flagged every 6 feet.

b. Supporting stanchions shall be capable of resisting a 16-pound force applied horizontally 30 inches high from the base of the stanchion.

c. The wire, rope or chain shall have a minimum tensile stress of 500 pounds.

6.2.4.3 Designated Area

Designated area is a system used during general industry work on flat or minimum sloped roofs for conducting work, of mechanical equipment (other than roof inspections), or conducting other general industry work (e.g., HVAC repairs). In addition to the requirements of the warning line system, a 100% transition is also required from the access point to the designated area. The minimum breaking strength of the line is 200 pounds.



Designated Area

6.2.4.4 Other Engineered Fall Protection Systems

Commercially available engineered/integrated systems are recognized as effective Fall Protection and may be used. These are systems that are not addressed in this chapter. These commercially available engineered systems shall be designed, installed, certified and used under the supervision of a QP for FP only. They shall be used per manufacturer's instructions and recommendations. The CP for FP may (if deemed appropriate by the QP for FP), supervise the assembly, disassembly, use, and inspection of the engineered system, under the direction of the QP for FP. The design shall include drawings, required clearance, and instructions on proper installation, use, and inspection requirements.

Sky Web

6.2.4.5 Suspended Rope Access

a. Suspended Rope Access Program Requirements
   1. The work shall be overseen by the designated rope access technician
   2. Develop Rope Access Plan that shall include the following:
      a) Effective management
      b) Accommodation of access method to the environment
      c) Rescue plan
      d) Expertise of rope access technician
      e) Assignment of duties consistent with individual's specific level of capabilities.

b. Suspended Rope Access Worksite Classification
   1. Simple
      a) Unaffected by any adjacent work or trades
      b) Simple path from the anchor point to the ground or platform level below including access
      c) There is no requirement to pass knots or deviations greater than 20 degrees.
   2. Complex
      a) Simultaneous adjacent work affecting rope access technician;
      b) Extraordinary environmental factors
      c) Bottom egress encumbered or unavailable.
   3. System Requirements
      a) The system shall provide for access, egress and backup system
      b) Provide duel protection that will include Progress System (primary support) and safety back-up system (provided by ANSI Z359 fall arrest system)

c) The rope access system shall be attached to rope access anchorages
d) The anchorage connectors shall comply with ANSI Z359.18 Standard
e) Fall distance is limited
f) Adequate clearance is provided
g) Minimization of swing fall
h) The average arresting force shall be less than 900 pounds.

c. Suspended Rope Access Components

1. Rope. Shall be tested with Cordage Institute C1801 and having a minimum breaking strength of 5,000 lbs.
2. Descenders shall meet ANSI Z359.9 Standard
3. Ascending devices
4. Screw links
5. Back-up devices
6. Cows' tail which is part of the back-up system
7. Hardware which includes buckles and rings
8. Connectors which includes snaphooks and carabiners
9. Helmets.

Rope access use

6.2.4.6 Ladder Cages

Ladder cages may be required per varying standards and regulations, but it must be clearly understood that the installation and or use of cages does not provide adequate protection or mitigation of a fall hazard.

Note:

Although presently allowed by OSHA, Ladder cages or "wells" do not provide safe Fall Protection. They cannot stop a fall. The purpose of the ladder cage is to afford the worker the ability to lean back and support him-self or her-self if necessary to rest during climbing. For more information see Pg 83 for additional info on ladder cages.

Note

For additional requirements on phasing out of ladder cage usage, see para 7.12.1 and OPNAV M-5100.23 Ch 13.

6.2.5 Prohibited Fall Protection Systems

6.2.5.1 Safety Monitoring System (Competent Person for Fall Protection)

The safety monitoring system must not be used as a Fall Protection method. "Unified Facilities Guide Specification UFGS 01 35 26 titled Governmental Safety Requirements" and USACE EM 385-1-1 latest edition prohibits the use of the safety monitor as a Fall Protection method.

6.2.5.2 Controlled Access Zone

Controlled access zone must not be used as a Fall Protection system.

End of Section

7 FALL PROTECTION BEST PRACTICES AND GUIDELINES FOR SPECIFIC WORK APPLICATIONS

7.1 Best Practices for Roof Work

7.1.1 General Industry Work only

a. Work on Flat or Low-Sloped Roofs Less than 4/12 slope

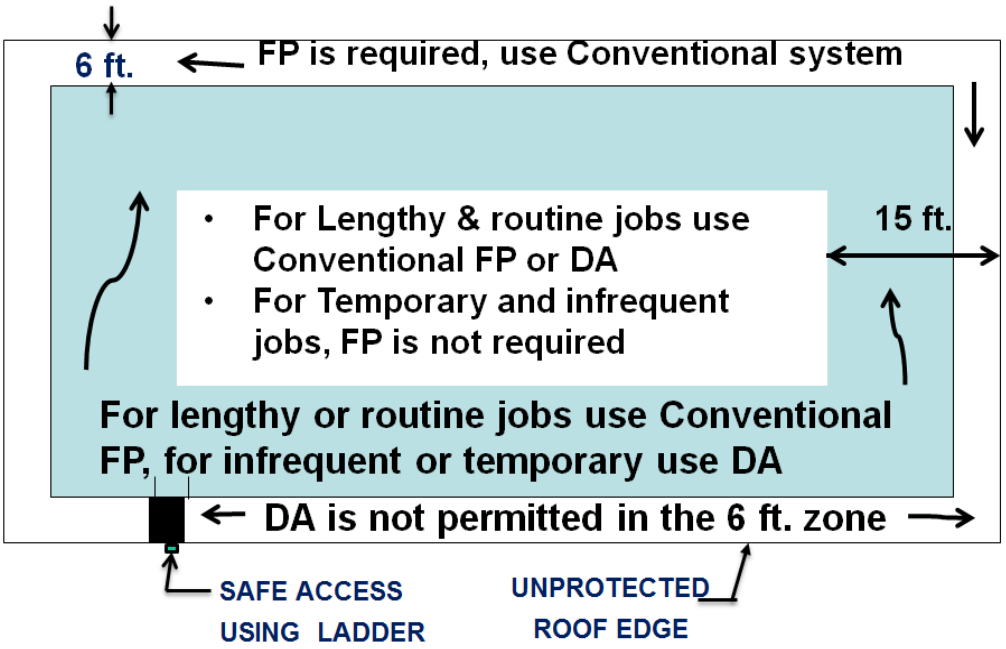
1. When work is performed less than **6 feet** from the unprotected roof edge, ensure each employee is protected from falling by the use of conventional Fall Protection system (guardrail system, safety net system, travel restraint system, or personal fall arrest system). **Designated area (DA)** is not permitted.

2. When work is performed at least **6 feet but less than 15 feet** from the unprotected roof edge, ensure each employee is protected from falling by using a guardrail system, safety net system, travel restraint system, or personal fall arrest system. The use of a **designated area** is also acceptable when performing work that is both **infrequent and temporary**. For lengthy or routine jobs involving exposure to fall hazards, only conventional Fall Protection systems are required

3. When work is performed 15 feet or more from the roof edge:

a) Each employee shall be protected from falling by the use of guardrail system, safety net system, travel restraint system, or personal fall arrest system or a designated area. Fall Protection is not required, provided the work performed is both **infrequent and temporary**; for lengthy or routine work, use conventional Fall Protection systems or designated area.

b) Implement and enforce a work rule prohibiting employees from going within 15 feet of the roof edge without using Fall Protection system.

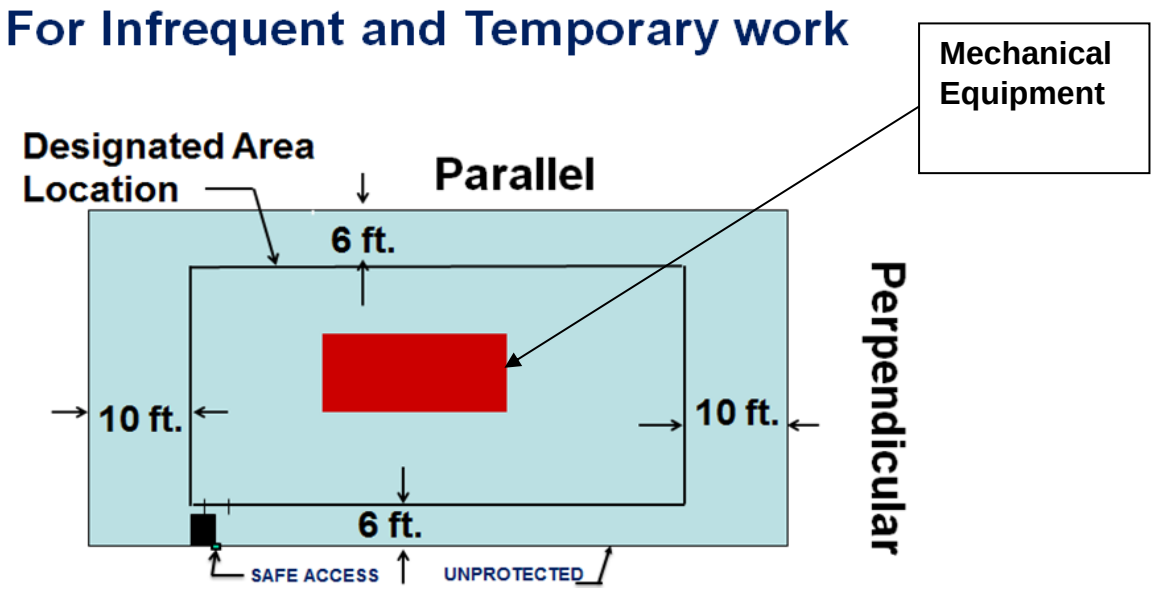


c) For steep roofs Fall Protection is required, use only conventional Fall Protection systems (guardrail or personal Fall Protection systems).

d) When **mobile mechanical equipment** is used to perform work that is both infrequent and temporary in the **designated area**, the warning line shall be erected from the unprotected roof edge:

1. No less than 6 feet that is parallel to the direction in which mechanical equipment is operated, and

2. Not less than 10 feet that is perpendicular to the direction in which mechanical equipment is operated.



7.1.2 Construction Work

a. Working within six feet of unguarded roof edge having a slope less than 4/12

1. During performance of construction work on low-pitched roofs with a potential Fall-Hazard greater than 4 feet, ensure that employees engaged in such work shall be protected from falling from all unprotected edges of the roof as follows:

a) Use restraint or fall-arrest systems, or

b) Use warning-line system for personnel working more than six feet away from the unprotected edge.

c) Mechanical equipment shall be used or stored only in areas where employees are protected by a warning-line system, restraint, or fall-arrest systems.

d) On flat roofs with no parapet or guardrails: When working 6 feet from the edge, use a full-body harness and lanyard for restraint system. Establish a warning line system or designated area six to ten feet away from the unprotected edge or temporary guardrails for roofing work without fall-arrest system. Personnel working within the warning line system do not require Fall Protection. For other trades (i.e. mechanical work) the warning line shall be installed 15 feet away from the edge.

b. Steep roof (greater than a 4/12 pitch):

1. A fall-arrest or guardrail system shall be used when working on steep roofs. Warning line and safety monitor system are prohibited on surfaces exceeding a 4 in 12 pitch, and on any surface, whose dimensions are less than 45 inches in all directions. Use a full-body harness, self-retracting device, roof brackets/anchors for anchorage points (single or multiple connections designed for 5000 pounds per person). Also, use slide guards.

7.2 Inspection, Investigation and Assessment Work (For General Industry and Construction)

a. Fall Protection Best Practices when Performing Inspection, Investigation and Assessment of Workplace Conditions for General Industry Work (i.e. Mechanical equipment) and during Construction work conducted on flat or Low sloped roofs

Note

OSHA permits conducting inspections and investigations of roofs without Fall Protection. This is called the 29 CFR 1910, Subpart D Exemption and Subpart M Exception.

1. When inspection and investigation work of workplace conditions (i.e. inspecting mechanical equipment) or during construction work is performed prior to start of work or after work has been completed, **Fall Protection is not required, except:**
    a. When FP systems or equipment have been installed and are available for workers to use for pre-work and post-work inspections, investigations or assessments, the above exemption does not apply.
    b. When inspection, investigation or assessment work is performed within 6 ft. of unprotected roof edge, conventional Fall Protection system is required, which includes, guardrail, safety nets or personal Fall Protection system. **(DON Requirement)**
    c. When inspection, investigation work of mechanical equipment is performed on steep roofs (more than 4/12 slope), conventional Fall Protection systems is required.

7.3 Communication Towers

Maintenance Work. The preferred method for access to existing towers for the performance of maintenance work is by the use of fixed ladders with attached climbing devices because it provides conventional Fall Protection during ascent and descent of the structure.

1. To secure permanent anchorage on the tower, the first worker to ascend is the one who installs the self-retracting lanyard for the next worker's use. Work on the tower requires a portable anchor, full-body harness, use of a self-retracting lanyard (SRL), ladder-climbing device, or fall arrester
2. After permanent anchorage is secured in place, workers who follow the first person up shall require full-body harness, a SRL, single anchor vertical lifeline, climbing fall arrest system, and/or rope grab
3. When working on towers, workers are required to wear fall-arrest equipment at all times
4. All climbing facilities shall be visually inspected daily for rust, corrosion, deterioration, or other hazards on the climbing facilities that could lead to death or injury of an employee in the performance of their duties, at the base of the structure by a Competent Person. Additionally, the climbing facilities shall be visually inspected for these items by the employees as they ascend to the elevation point where work is being performed. If any such hazard is identified during inspection, employees shall not use the climbing facility until such hazards are abated.

7.4 Tower Erection

Personnel Lifting. Before an employee may perform any job related to the hoisting of personnel at heights for work, the employees shall receive training on safe access. The operator of the hoist shall have thorough understanding and comply with sub-rules (1) through (7) of hoisting personnel on hoist lines, as well as following all applicable requirements of NAVFAC P307, USACE EM 385-1-1 and 29 CFR 1926.

1. An anti-two-block device shall be used on all hoist lines, except where ambient radiation frequency (RF) precludes that use. In such case, a site-specific site rigging site plan shall be established and maintained on site to ensure that two-blocking cannot occur, and that effective communication between the hoist operator and personnel being lifted is maintained at all times.
2. A trial lift of the maximum intended personnel load shall be made from ground level to the location to which personnel are to be hoisted.
3. A pre-lift meeting shall be held before the trial lift at each location and each time a new employee is assigned to the operation.
4. The Safety Office shall ensure that lift-related documentation remains on site during the entire length of the project or task.
5. Employees shall be hoisted to their workstations by using a personnel platform, boatswains chair and/or boatswains seat type and full-body harness.
6. Employees being hoisted shall remain in continuous sight of, and/or in direct communication with, the operator or signal person.
7. Employees shall not be hoisted during adverse weather conditions (high winds, electrical storms, snow, ice or sleet) or other impending danger, except in the case of emergency employee rescue.

7.5 Leading Edge Work

Use horizontal lifelines with full-body harness, and lanyard/self-retracting device, roof anchors, temporary guardrail system, or a restraint system.

7.6 Scaffold Work

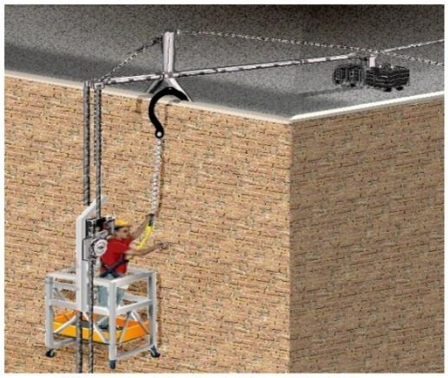
a. Use guardrails, cross bracing or personal Fall Protection system including full-body harness, and lifelines. During erection and dismantling operations, it is highly recommended to have a Fall Protection system. During erection and dismantling of scaffolds, an evaluation shall be conducted by the Competent Person to determine the feasibility and safety of providing Fall Protection.
b. On supported scaffolds over 20 feet high, use stairs instead of ladders to access the scaffold.
Note: Some scaffolding manufactures include recommended tie-off locations in their operating instruction or manuals. The Competent Person will ensure this guidance is followed when personal Fall Protection systems will be used.

7.7 Suspended Scaffolds

(Including Single and Two-Point Suspended Scaffolds)

a. In addition to railing, use an independent single anchor vertical lifeline connected to a full-body harness for every worker in suspended scaffolds.
b. 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;
c. The rope of the vertical lifeline shall be of the material and diameter compatible with requirements as marked on the fall-arrester;

d. The suspended scaffold shall be maintained in accordance with manufacturer's instructions and specifications.



Single Point Scaffold

Two Point Scaffold

7.8 Work-Stands, Stationary Work Platforms and Catwalks

a. Work-stands, 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.

Work Stand

7.9 Aerial Work Platforms

a. Applicable Equipment:

1. Vehicle mounted Rotating and Elevating Aerial Devices -ANSI A92.2 (Figure – 1)
2. Manually Propelled Elevating Work Platforms - ANSI A92.3 – (Figure – 2)
3. Boom Supported Elevating Work Platforms - ANSI A92.5 (Figure- 3)
4. Self-Supported Elevating Work Platforms/Scissor Lifts - ANSI A 92.6 (Figure – 4)

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

7.9.1 Aerial Lift Equipment

a. 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 (i.e., JLG) or a basket (i.e., "cherry picker") used to raise and lower employees.

b. Aerial lifting equipment that has a boom (articulating or non-articulating) sometimes is subjected 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 shall stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work positioning.

c. Occupants in aerial lifts shall 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 great enough. The best connecting device option is an adjustable energy-absorbing lanyard.

d. 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. For example, if an employee were wearing a full-body harness with a six-foot lanyard connected to the dorsal D-ring, the lanyard necessarily would be connected at the foot level in order to prevent ejection over the guardrail or out of the basket. Exception: A six-foot lanyard could be used connected to an anchorage higher than foot level, if it were a tieback or adjustable style in which the lanyard could be shortened. A lanyard with a shock absorber can be used in a "restraint system" since the employee will not experience forces great enough to deploy the shock absorber.

e. Before elevating the work platform of a boom-supported articulating lift, the operator shall verify that all occupants' full-body harnesses are on, and donned properly.

f. The use of self-retracting devices is not permitted in aerial lifts.

g. Working over water: See paragraph 7.15 below.

7.9.2 Scissor Lifts

a. Self-Supported Elevating Work Platforms/Scissor Lifts (ANSI A92.6 Equipment) four feet or higher shall be equipped with standard guardrails. In addition to the guardrail provided, the equipment shall be equipped with anchorages meeting ANSI Z359, Fall Protection Code/Standards.

b. A restraint system must be used in addition to guardrails. Lanyards used with the restraint system shall 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 shall not be used or shall be removed from service. Should the worker's feet leave the floor or 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 located outside the work-platform, in case the scissor lifts were to travel.

7.9.3 Mobile Scaffolds

a. Manually Propelled Elevating Work Platforms (per ANSI/SIA A92.3). The platform of the mobile scaffolds shall be equipped with standard guardrail. If the platform is equipped with manufacturer installed anchorages meeting ANSI Z359 Fall Protection Code, a restraint system must be used in addition to the guardrails. Lanyards used with the restraint system shall be sufficiently short to prohibit workers from climbing out of, or being ejected from the platform. Adjustable lanyards with built-in shock absorbers are acceptable. The use of a self-retracting device is not acceptable.
b. The platform shall not be occupied when moved and at no time will workers be allowed to climb on or over the guardrails.

7.9.4 Safety Operating Procedures for Preventing Aerial Work Platforms from Tipping Over and Causing Fall Mishaps

7.9.4.1 Best Practices:

a. There are hazards associated with using AWPs that can be minimized if the work is accomplished using the appropriate equipment for the specific task and job site.
b. The equipment should only be used for the intended application. Never attempt to use the equipment as a crane and never load the platform beyond its maximum rated capacity.
c. Operators should park the equipment on level and stable ground and operate it within the design specifications and instruction of the manufacturer.
d. Before the equipment is used and during use, the operator should check the work area for possible hazards such as, but not limited to:

1. Trenches, holes or openings, including those concealed by water, ice, mud, etc.
2. Sloping or uneven ground or floor
3. Debris, bump and floor obstructions
4. Wind and weather conditions
5. Inadequate surface and support to withstand all load forces imposed by the machine in all directions
6. Overhead obstructions and electrical conductors
7. Presence of personnel below or in the immediate vicinity
8. Hazardous location and atmospheres

e. During use, the operator should maintain:

1. Clear view of the path of travel
2. Safe distance from trenches, obstacles, debris, drop-offs, holes, and depressions, ramps, and other hazards to ensure safe travel
3. Safe distance from overhead obstacles
4. Never move the AWP with occupants in and elevated platform, basket or bucket
5. Manually propelled platforms shall not be occupied when moved

f. Prior to elevating the platform, the operator should verify the access gate or opening is closed per manufacturer's instructions.
g. Tying off to an adjacent structure or pole is not permitted unless a safe device for 100% tie-off is used for the transfer.

7.9.5 Types of Aerial Work Platforms

Figure 1
Vehicle-Mounted Elevating Work Platform

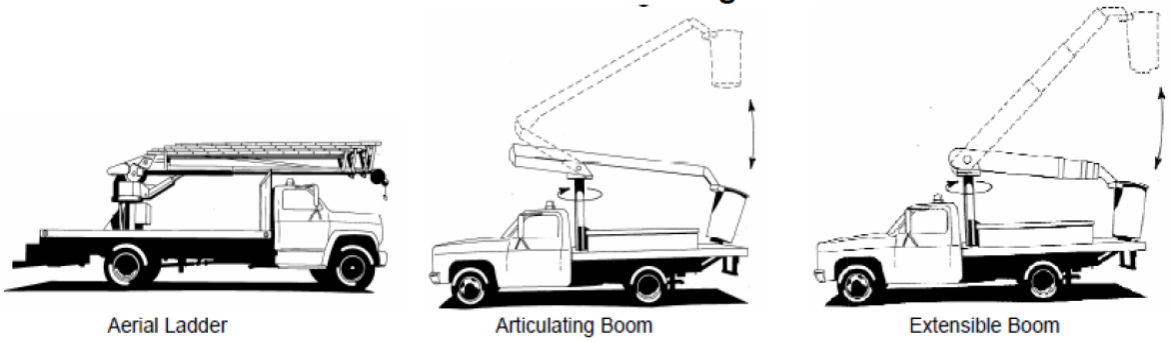


Figure 2
Manually Propelled Elevating Work Platform

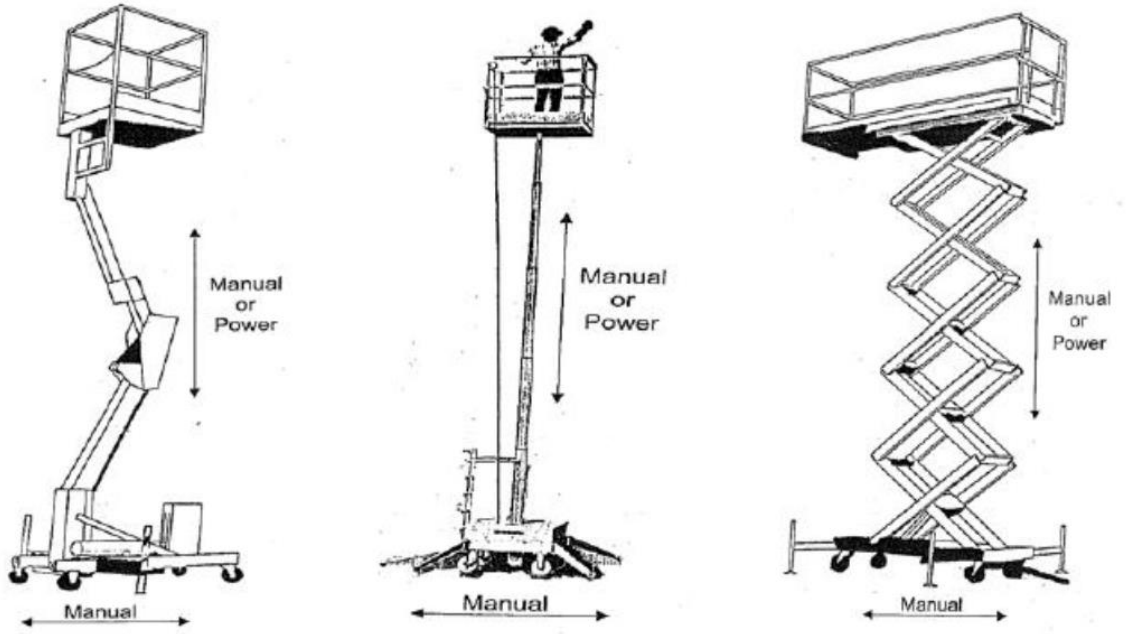


Figure 3
Boom-Supported Elevating Work Platform

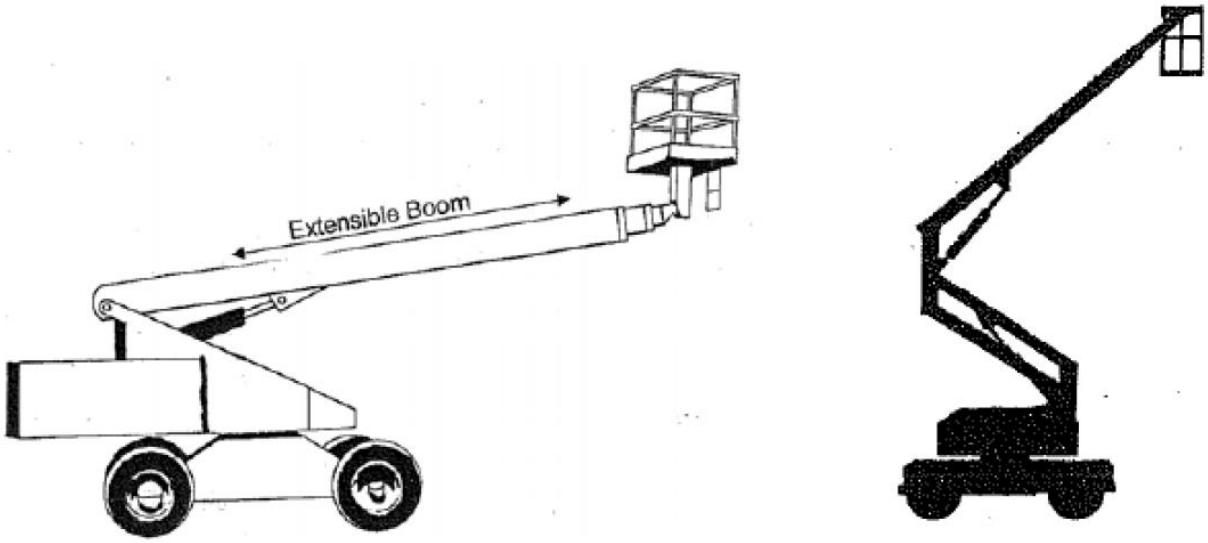
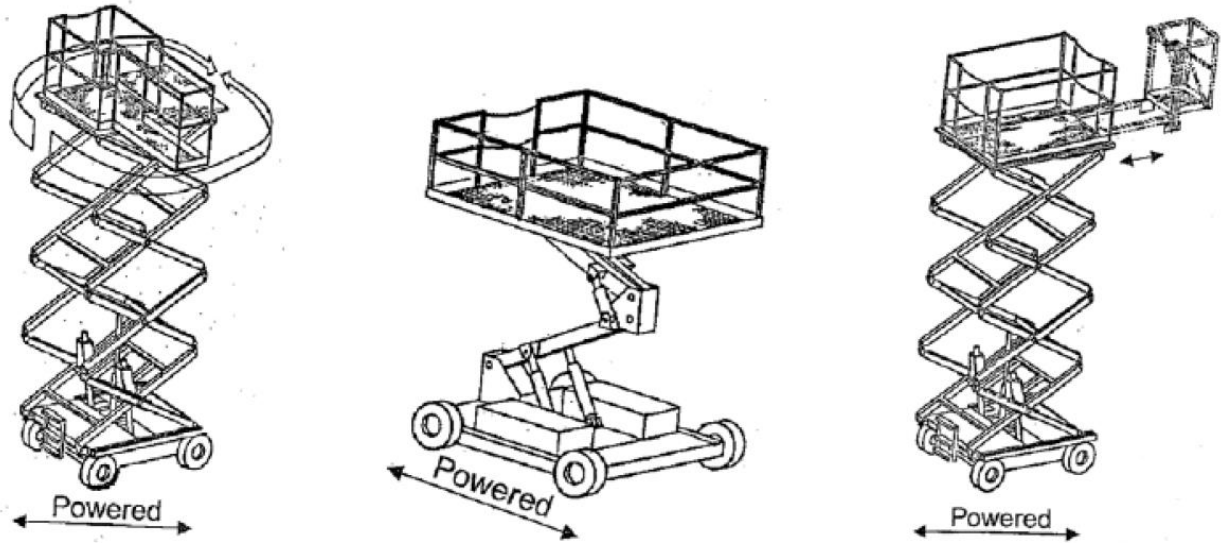


Figure 4
Self Propelled Elevating Work Platform



Scissor Lifts

7.10 Fall Hazards Encountered During 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 shall be tied to a lifeline, SRL, and rescue and retrieval equipment. The attendant, who is able to retrieve the victim by utilizing the retrieval mechanism from outside the confined space without difficulty, must be present and shall be protected with a Fall Protection system. The Fall

Protection Program Manager and/or Competent Person for Fall Protection should coordinate with the Confined Space Program Manager or Gas-Free Engineer before any entry occurs to ensure entrants are protected from all fall-related hazards.

Note: Any command or facility can prescribe additional requirements above and beyond the requirements prescribed in either reference (b), (c), or (d).

Tripod used for safe entry

7.11 Excavated Trenches or Holes Deeper Than Six Feet

a. 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.

b. When persons for the purpose of inspection/testing will be around an excavation that is between 6 feet and 20 feet deep, that has vertical face leading edge fall hazard exposure (sides of the of excavation have not been laid back), or that contains hazards (e.g. impalement hazards, hazardous substances), they shall be protected from falling by the use of a Fall Protection method.

Exception: The designated competent person for excavation may exempt the use of Fall Protection for inspectors/supervisors provided those individuals are not exposed to fall hazards within 24 inches from the edges, the excavation contains no hazards and the individual(s) stay a minimum of 24 inches from the excavation edge.

Note 1: With regard to fall hazards, OSHA, EM 385 and the DON Fall Protection Guide do not address how far Fall Protection is installed from the edges of excavations that are more than 6 feet deep. Additionally, there is no requirement for having a Fall Protection system installed 6 feet away from the edges of excavations. The Competent person for Excavation will determine the distance, which is based on many variables. However, per OSHA Subpart M, the Fall Protection systems that can be used to protect personnel from falling into the excavation are either guardrail, fence, barricade or cover. According to 29 CFR 1926.501(b)(7)(ii) which states the following:

"Each employee at the edge of a well, pit, shaft, and similar excavation 6 feet or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers. Where a guardrail system, fence or barricade is infeasible, use of personal fall arrest systems is an acceptable

alternative. As long as all the exposed employees are protected with a personal fall arrest system, there is no additional requirement for a warning line."

The above interpretation letter from OSHA does not permit the use of warning line system to protect workers falling into excavation. The warning line system is only permitted to protect employees from the hazards of cave-ins which is based on the distance alone from the excavation edges which is equal to twice the depth of excavation (this is without the use of guardrail, fence, cover or active Fall Protection systems). Please see the following OSHA letter of interpretation: https://www.osha.gov/laws-regs/standardinterpretations/1991-12-02-1

That being said, when the cave-in hazard is mitigated (Cave-in is not an issue), installing guardrails or fences to protect workers from falling does not have to be six feet or more from the edge of excavation; as required when using a warning line system on roofs, which is not permitted by OSHA. On the other hand, the use of a cover is a form of fall hazard mitigation.

Any command or facility can prescribe additional requirements above and beyond the requirements prescribed in reference (b).

7.12 Safe Work Practices on Ladders and Stairways

7.12.1 Portable and Fixed Ladders

a. Application. Ensure that each ladder used meets the Best practices of this section. This section covers all ladders, except when the ladder is:

1. Used in emergency operations such as firefighting, rescue, and tactical law enforcement operations, or training for these operations; or

2. Designed into or is an integral part of machines or equipment.

b. General Best practices for All Ladders. Ensure the following:

1. Ladder rungs, steps, and cleats are parallel, level, and uniformly spaced when the ladder is in position for use

2. Ladder rungs, steps, and cleats are spaced not less than 10 inches and not more than 14 inches apart, as measured between the centerlines of the rungs, cleats, and steps, except that:

i. Ladder rungs and steps in elevator shafts must be spaced not less than 6 inches) apart and not more than 16.5 inches apart, as measured along the ladder side rails, and

ii. Fixed ladder rungs and steps on telecommunication towers must be spaced not more than 18 inches apart, measured between the centerlines of the rungs or steps

3. Steps on stepstools are spaced not less than 8 inches apart and not more than 12 inches apart, as measured between the centerlines of the steps

4. Ladder rungs, steps, and cleats have a minimum clear width of 11.5 inches on portable ladders and 16 inches (measured before installation of climbing ladder fall arrest system (ladder safety systems) for fixed ladders, except that:

i. The minimum clear width does not apply to ladders with narrow rungs that are not designed to be stepped on, such as those located on the tapered end of orchard ladders and similar ladders

ii. Rungs and steps of manhole entry ladders that are supported by the manhole opening must have a minimum clear width of 9 inches

iii. Rungs and steps on rolling ladders used in telecommunication centers must have a minimum clear width of 8 inches, and

iv. Step-stools have a minimum clear width of 10.5 inches

5. Wooden ladders are not coated with any material that may obscure structural defects

6. Metal ladders are made with corrosion-resistant material or protected against corrosion

7. Ladder surfaces are free of puncture and laceration hazards

8. Ladders are used only for the purposes for which they were designed

9. Ladders are inspected before initial use in each work shift, and more frequently as necessary, to identify any visible defects that could cause employee injury

10. Any ladder with structural or other defects is immediately tagged "Dangerous: Do Not Use" and removed from service until repaired or replaced

11. Each employee faces the ladder when climbing up or down it\

12. Each employee uses at least one hand to grasp the ladder when climbing up and down it

13. No employee carries any object or load that could cause the employee to lose balance and fall while climbing up or down the ladder.

c. Portable Ladders. (Non-Self Supporting). The command shall ensure:

1. Rungs and steps of portable metal ladders are corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize the possibility of slipping

2. Each stepladder or combination ladder used in a stepladder mode is equipped with a metal spreader or locking device that securely holds the front and back sections in an open position while the ladder is in use

3. Ladders are not loaded beyond the maximum intended load; the maximum intended load, includes the total load (weight and force) of the employee and all tools, equipment, and materials being carried

4. Ladders are used only on stable and level surfaces unless they are secured or stabilized to prevent accidental displacement

5. No portable single rail ladders are used

6. No ladder is moved, shifted, or extended while an employee is on it

7. Ladders placed in locations such as passageways, doorways, or driveways where they can be displaced by other activities or traffic

i. Are secured to prevent accidental displacement, or

ii. Are guarded by a temporary barricade, such as a row of traffic cones or caution tape, to keep the activities or traffic away from the ladder

8. The cap (if equipped) and top step of a stepladder are not used as steps

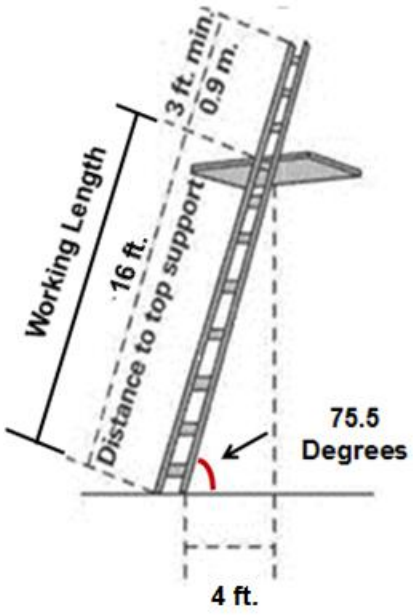
9. Portable ladders used on slippery surfaces are secured and stabilized

10. The top of a non-self-supporting ladder is placed so that both side rails are supported, unless the ladder is equipped with a single support attachment

11. Portable ladders used to gain access to an upper landing surface have side rails that extend at least 3 feet above the upper landing surface

12. Ladders and ladder sections are not tied or fastened together to provide added length unless they are specifically designed for such use

13. Ladders are not placed on boxes, barrels, or other unstable bases to obtain additional height.



Correct way of setting Portable ladder

d. Fixed Ladders. The command shall ensure:

1. Fixed ladders are capable of supporting their maximum intended load
2. The minimum perpendicular distance from the centerline of the steps or rungs, or grab bars, or both, to the nearest permanent object behind the ladder is 7 inches, except for elevator pit ladders, which have a minimum perpendicular distance of 4.5 inches
3. Grab bars do not protrude on the climbing side beyond the rungs of the ladder that they serve
4. The side rails of through or side-step ladders extend 42 inches above the top of the access level or landing platform served by the ladder. For parapet ladders, the access level is:
   i. The roof, if the parapet is cut to permit passage through the parapet; or
   ii. The top of the parapet, if the parapet is continuous
5. For through ladders, the steps or rungs are omitted from the extensions, and the side rails are flared to provide not less than 24 inches and not more than 30 inches of clearance. When a climbing ladder fall arrest system (ladder safety system) is provided, the maximum clearance between side rails of the extension must not exceed 36 inches
6. For side-step ladders, the side rails, rungs, and steps must be continuous in the extension
7. The minimum size (cross-section) of grab bars is the same size as the rungs of the ladder
8. When a fixed ladder terminates at a hatch, the hatch cover:
   i. Opens with sufficient clearance to provide easy access to or from the ladder; and
   ii. Opens at least 70 degrees from horizontal if the hatch is counterbalanced
9. Individual-rung ladders are constructed to prevent the employee's feet from sliding off the ends of the rungs
10. Fixed ladders having a pitch greater than 90 degrees from the horizontal are not used
11. The step-across distance from the centerline of the rungs or steps is:
    i. For through ladders, not less than 7 inches and not more than 12 inches to the nearest edge of the structure, building, or equipment accessed from the ladders

ii. For side-step ladders, not less than 15 inches (38 cm) and not more than 20 inches to the access points of the platform edge

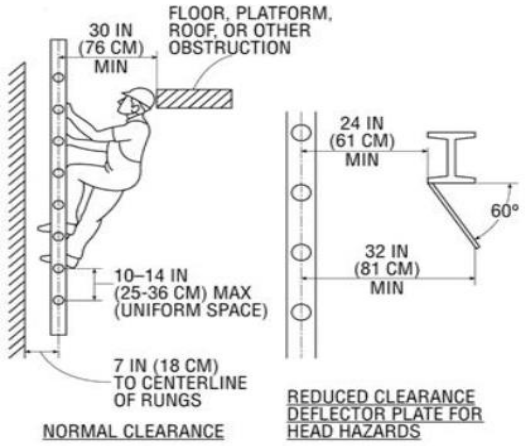
12. Fixed ladders that do not have cages or wells have:

i. A clear width of at least 15 inches on each side of the ladder centerline to the nearest permanent object; and

ii. A minimum perpendicular distance of 30 inches from the centerline of the steps or rungs to the nearest object on the climbing side. When unavoidable obstructions are encountered, the minimum clearance at the obstruction may be reduced to 24 inches, provided deflector plates are installed.

13. The entrance of the ladder way to the top level or platform shall be protected by the use of self-closing gate or an offset.

14. An employee shall 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 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 the horizontal rungs with both hands instead of holding on the vertical side rails



e. Requirements for Fixed Ladders Over 24 ft. in Length (Final Rule Changes)

Fixed ladders that extend more than 24 feet above a lower level, the Command shall ensure:

1. Existing fixed ladders. Each fixed ladder installed before 19 November, 2018 is equipped with a personal fall arrest system, ladder safety system, cage, or well

2. New fixed ladders. Each fixed ladder installed on and after 19 November, 2018, is equipped with a personal fall arrest system or climbing ladder fall arrest system (ladder safety system)

3. Fixed Ladder Replacement. When a fixed ladder, cage, or well, or any portion of a section thereof, is replaced, a personal fall arrest system or ladder safety system is installed in at least that section of the fixed ladder, cage, or well where the replacement is located

4. Final deadline. On and after November 18, 2036, all fixed ladders are equipped with a personal fall arrest system or a ladder safety system.

Note 1:

At the end of 20 years, final paragraph 29 CFR 1910.28(b)(9)(i)(D) OSHA specifies that all fixed ladders must be equipped with ladder safety or personal fall arrest systems. (OSHA notes that after the 20-year phase out period ends employers may still have or equip fixed ladders with cages and wells, but OSHA will not consider them to not be a means of Fall Protection.)"

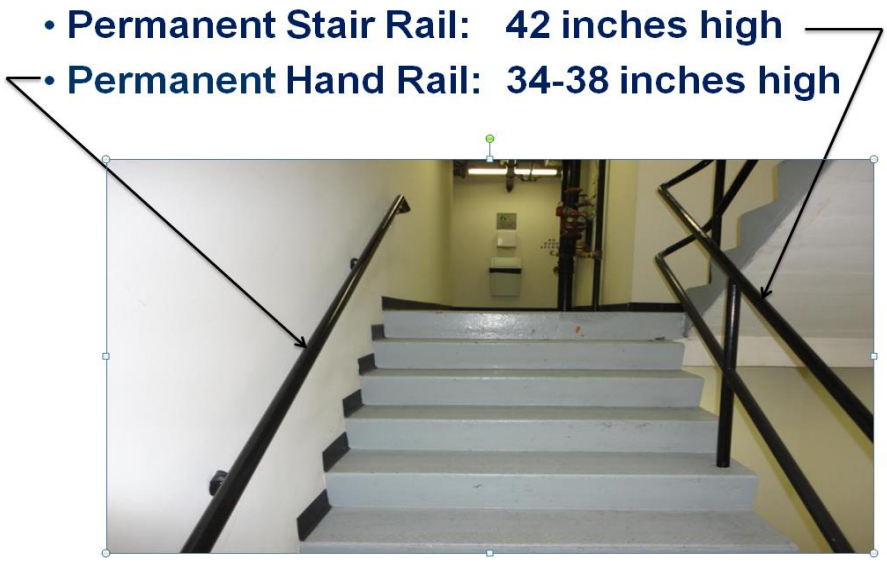
"OSHA points out that final paragraph (b)(9)(i)(B) does not prohibit employers from also installing cages and wells on new fixed ladders in addition to ladder safety or personal fall arrest systems. Cages and wells can provide a way for workers to rest while they are climbing and working on fixed ladders. However, OSHA stresses that employers may not use cages and wells instead of providing ladder safety and personal fall arrest systems. In addition, employers must ensure that the cages and wells are compatible with and do not interfere with the ladder safety or personal fall arrest systems especially when rescuing a worker inside the cage. (See final paragraph (b)(9)(iv) for further discussion.)" Additionally, if cages are installed on fixed ladders less than 24 ft. in length can be used beyond November 2036; OSHA does not require removal of these cages. It is recommended to remove the cages installed on ladders longer than 24 ft. and equipped with climbing ladder fall arrest system or other fall arrest system because of the difficulty of rescuing someone inside the cage.

7.12.2 Portable Ladders – Self-Supporting (Stepladders)

a. Neither the top of a stepladder nor the step below the top of the ladder (top step) shall be used as a step, nor used to stand on while performing work.
b. Do not use a closed stepladder as a straight ladder – it may slip out.
c. Stepladders shall not exceed 20 feet in length.
d. The steps of a stepladder must be corrugated, knurled, dimpled, coated with skid-resistant material, or treated to minimize slipping.

7.12.3 Stairways

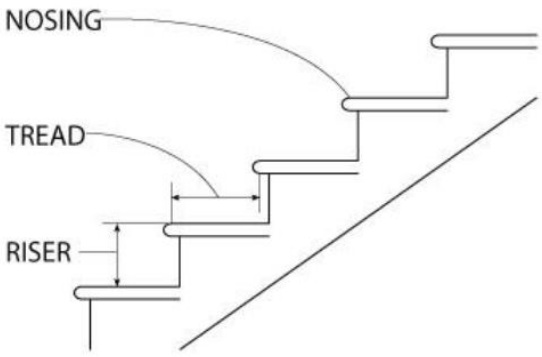
a. Stairways having four or more risers, or rising more than 30 inches in height, must have at least one handrail; however, where stairs serve as means of egress, they shall have two handrails. A stair-rail also must be installed along each unprotected side or edge.
b. The top rail of a stair-rail is required to be 42 inches above the walking surface; and stair handrails must be no more than 38 inches or less than 34 inches from the upper surface of the stair-rail to the surface of the tread. Studies have concluded that people of average height do not grasp handrails higher than 38 inches due to shoulder discomfort. The International Building Code (IBC), the International Fire Code (IFC), and the National Fire Protection Association (*NFPA 101*) *Life Safety Code* require the height of new permanent handrails to be 34-38 inches, and 42 inches for permanent stair-rails. Existing handrails may be no less than 30 inches above the nose of stair treads. The final Rule Requirements for stair rails are identical to IBC and IFC.



Industrial Stairs

c. Mid-rails, screens, mesh, or intermediate horizontal members must be provided between the handrail and stairway nosing. In these applications, Intermediate horizontal members, when used, must not be more than 19 inches apart.

d. Unprotected sides and edges of stairway landings must be provided with a top-rail 42 inches in height (+/- 3 inches) and horizontal mid-rail or mid-rails spaced no more than 19 inches apart.



Standard Stair Dimensions

7.13 Working Near Wall Openings

a. Wall opening: An opening at least 30 inches high and 18 inches wide, in any wall or partition, through which persons may fall.

b. Any time work is performed near a wall or window opening where there *is a Fa*ll-*Hazard to a low*er level; Fall Protection must be provided (e.g., guardrail or fall arrest system).

7.14 Climbing and Working on Wood Poles

a. According to OSHA and ASTM F887 standard the requirement for climbing and working on wood poles is to use a body-belt with Wood Pole Fall Restricting Device (WPFRD) which is basically a belt that wraps around the pole. The WPFRD is attached to the two side D-rings of the body belt to facilitate climbing and working on the pole as a positioning system. This does not comply with ANSI Z359 FP Code or this Guide because of the use of body belt only and without using a back-up system when working on top of the pole.

b. Use a full body harness to facilitate rescue equipped with multiple D-rings (two side D-rings, sternal and dorsal) and a body belt. The two side D-rings are used for attaching the WPFRD to climb the pole.

c. When transitioning over the cross arm during climbing and working on the pole, the person can use an adjustable work-positioning lanyard for 100% tie off

d. If it is feasible, utilize aerial Work Platforms.

e. Personnel shall be trained on rescue

Wood Pole Fall Restriction

Body Belts equipped with either two or 4 Side D-rings

Adjustable Rope Lanyard

Adjustable lanyard

FBH with Body Belt

Wood Pole Climbing Equipment

7.14.1 Methods of Inspecting and Testing of Wood Poles

a. When personnel are to perform work on a wood pole, it is important to determine the condition of the pole before employees climb it. The weight of the employee, the weight of equipment to be installed, and other working stresses (such as the removal or re-tensioning of conductors) can lead to the failure of a defective pole or a pole that is not designed to handle the additional stresses. For these reasons, it is essential that, before an employee climbs a wood pole, the employer ascertain that the pole is capable of sustaining the stresses of the work. The determination that the pole is capable of sustaining these stresses includes an inspection of the condition of the pole.

If the pole is determined to be unsafe to climb or to work from, it must be secured so that it does not fail while a worker is on it. The pole can be secured by a line truck boom, by ropes or guys, or by lashing a new pole alongside it. If a new one is lashed alongside the defective pole, employees should work from the new one.

b. Inspecting Wood Poles

A qualified worker should inspect wood poles for the following conditions:

1. General condition. Buckling at the ground line or an unusual angle with respect to the ground may indicate that the pole has rotted or is broken.
2. Cracks. Horizontal cracks perpendicular to the grain of the wood may weaken the pole. Vertical cracks, although not normally considered a sign of a defective pole, can pose a hazard to the climber, and the employee should keep his or her gaffs away from them while climbing.
3. Holes. Hollow spots and woodpecker holes can reduce the strength of a wood pole.
4. Shell rot and decay. Rotting and decay are cutout hazards and possible indications of the age and internal condition of the pole.
5. Knots. One large knot or several smaller ones at the same height on the pole may be evidence of a weak point on the pole.
6. Depth of setting. Evidence of the existence of a former ground line substantially above the existing ground level may be an indication that the pole is no longer buried to a sufficient depth.

7. Soil conditions. Soft, wet, or loose soil around the base of the pole may indicate that the pole will not support any change in stress.

8. Burn marks. Burning from transformer failures or conductor faults could damage the pole so that it cannot withstand changes in mechanical stress.

c. Testing Wood Poles

The following tests, which are from 1910.268(n)(3), are acceptable methods of testing wood poles:

1. *Hammer test*. Rap the pole sharply with a hammer weighing about 1.4 kg (3 pounds), starting near the ground line and continuing upwards circumferentially around the pole to a height of approximately 1.8 meters (6 feet). The hammer will produce a clear sound and rebound sharply when striking sound wood. Decay pockets will be indicated by a dull sound or a less pronounced hammer rebound. Also, prod the pole as near the ground line as possible using a pole prod or a screwdriver with a blade at least 127 millimeters (5 inches) long. If substantial decay is present, the pole is unsafe.

2. *Rocking test*. Apply a horizontal force to the pole and attempt to rock it back and forth in a direction perpendicular to the line. Exercise caution to avoid causing power lines to swing together. Apply the force to the pole by either pushing it with a pike pole or pulling the pole with a rope. If the pole cracks during the test, it is unsafe.

A properly guyed pole in good condition should, at a minimum, be able to handle the weight of an employee climbing it.

The presence of any of these conditions is an indication that the pole may not be safe to climb or to work from. The employee performing the inspection must be qualified to make a determination as to whether it is safe to perform the work without taking additional precautions.

7.15 Working Over Water (On Piers, Wharves, Quay Walls, Barges, Aerial Lifts, Cranes-Supported Work Platforms)

Employees working above the 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 shall be present at locations where employees are working over, near, or adjacent to, water that they might fall into. Ring buoys and at least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water, 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 shall be prepared and used:

Additional Best Practices: When continuous Fall Protection is used without exception to prevent personnel from falling into the water, in this situation, the risk of drowning has been effectively removed and PFDs are not required.

a. Where water directly abuts the structure and the distance from walking/working surface to the water is 25 feet or more, personnel shall be protected from falling by the use of Fall Protection system, and PFDs are not required.

b. Where the distance from the walking /working surface to the water surface is less than 25 feet and the water depth is less than 10 feet, or hazards from machinery, barges, camels, or other structures

fastened to and directly abutting piers, quay walls or wharves, FP is required. Where fall-arrest equipment is used, anchorages must be identified.

c. Working from/in machinery (aerial lift equipment, cranes, or other mechanically operated equipment) directly over water, and the depth of water is at least 10 feet, Fall Protection is not required, however, personal floatation devices are required – do not use FP equipment.

d. Where certain locations or situations make FP infeasible or impractical, this does not justify such exceptions as the norm throughout.

e. If utilizing both PFD and full body harness, the full body harness shall be worn under the PFD. The type of PFD used shall not interfere with proper use of the full body harness and lanyard.

7.16 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 (5 feet in shipyard operations and 6 feet performing construction) or working on stilts, thereby reducing the height of the top rail in relation to the employee to less than 42 inches (plus or minus 3 inches), the height of the guardrail must be raised accordingly to maintain a protective height of 42" above the stilt or raised platform/work-stand height. If this is not possible, use another Fall Protection system.

End of Section

8 BEST PRACTICE FOR FALL RESCUE PROCEDURES

8.1 Introduction

A person working at heights, and using Fall Protection equipment, may require rescue if that person 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 written site-specific "Rescue Plan" must be prepared and maintained for all instances where personnel work at heights and are exposed to Fall Hazards regardless of height. The "Rescue Plan" shall 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 "Rescue Plan" is part of the written "Fall Protection and Prevention Plan" and contains provisions for self-rescue or assisted rescue of an end-user of Fall Protection. The "Fall Protection and Prevention Plan" covers every Fall-Hazard to which End Users are exposed to.

8.2 Background

Following a fall from height, the end-user of Fall Protection who is wearing a full body harness properly secured to an anchorage may be suspended in the harness for a length of time if self-rescue or assisted rescue by co-workers cannot be performed quickly. Sustained immobility in a full body harness may lead to suspension trauma also known as harness-induced pathology as described in reference (p). Suspension trauma resulting from the accumulation of blood in the veins is commonly called venous pooling. The symptoms (known as orthostatic intolerance) of suspension trauma include light-headedness, dizziness, weakness, and occasionally, fainting.

Normally, when an individual who faints and is laid onto a flat surface in a reasonable amount of time (usually 20 min), the pooled blood now no longer being held down by gravity, or trapped in the lower extremities by the leg straps of the full body harness returns to the heart, where it is once again distributed to the body. Assuming no injuries are caused during the collapse, the individual will quickly regain consciousness, and recovery is likely to be rapid.

When an individual suspended in a full body harness and hangs in a vertical or near-vertical position without leg motion, the same thing can happen; however, in this case when consciousness is lost, the person remains vertically suspended. An accumulation of blood in the legs reduces the amount of blood in circulation. After an initial speeding up of the heartbeat, the heart rate then slows, and blood pressure will diminish in the arteries. The reduction in quantity and/or quality (oxygen content) of blood flowing to the brain leads to unconsciousness and harmful effects on other vital organs. If these conditions continue, they potentially may be fatal.

The importance of a timely rescue of a worker suspended in a harness, or who has become incapacitated due to an injury and/or heart attack, mandates the need for a written rescue plan.

8.3 General Best Practices

Before an end-user of Fall Protection is exposed to a Fall Hazard, and before starting work activities, the Competent Person for Fall Protection and the end-user shall ensure that there are rescue plans in place that address the rescue of a person who has fallen and becomes suspended in a harness. End-users of Fall Protection shall be trained in the methods for minimizing the effect or delaying suspension trauma if an end-user is suspended in a body harness and unable to perform a self-rescue and needs to wait to be rescued (e.g., keep legs moving and raise knees to the body, to help prevent the pooling of blood in the legs).

Suspension straps attached to the harness can be used to minimize the effect of suspension trauma while the user is waiting for rescue. A strap for each leg is recommended. All end-users should be trained in the safe use of the straps.

8.4 Initiation of Rescue

An end-user using Fall Protection equipment must have an assigned safety person (spotter), 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 shall 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) shall have this capability, in the case of the end-user or team visiting another Navy or Marine Corps activity.

8.5 Fall Arrest Rescue Plan and Procedures

A site-specific rescue plan (for an employee suspended in a full body harness after a fall) shall be prepared in writing by the Navy or Marine Corps Activity Competent Person for Fall Protection. In the case of the end-user or team visiting another Navy or Marine Corps activity, the rescue plan shall include the following:

a. **Pre-incident Planning.** Per reference (c) (the *NFPA 101 Life Safety Code*), a written pre-incident plan is prepared by the jurisdictional public (e.g., city fire department) and/or government-emergency response agency (e.g., government fire department). As per reference (c): *"Pre-incident planning is ensuring that responding emergency personnel know as much as they can about a facility's construction, occupancy, and fire protection systems before an incident occurs. With this knowledge, the fire department can compare a potential incident at the facility with its available resources and plan the department's response accordingly. Pre-incident planning is not restricted to building components. It includes other factors and conditions that may be relevant to an emergency at a particular site."* The end-user or team leader of a group of end-users, in the case of the end-user or team visiting from another activity) in consultation and coordination with the Competent Person for Fall Protection shall verify that rescue procedures are in place for any workplace where the authorized rescuer will perform a rescue. The types of Fall Protection systems being used and the work environment shall be reviewed with the jurisdictional public and Government-emergency response agency. The pre-incident plan shall be reviewed and updated by the Navy or Marine Corps activity's Competent Person for Fall Protection annually, or whenever there is a change to the job-site that will affect items in the plan.

b. **Methods of Rescue.**

1. Self-rescue. An end-user who has fallen and is suspended in a fully body harness and not incapacitated (e.g. an injury, stroke or heart attack), can usually perform a self-rescue, where the following conditions exist:

a) The end-user can reach an adjoining structure, and has the strength and mobility to pull up and onto the structure.

b) The end-user has a self-deploying or manual-deploying coiled webbing rescue ladder attached to lanyard anchorage, which after a fall allows climbing up to the anchorage point (or at least simply standing on the ladder, allowing the necessary circulation of blood to the entire body while an assisted rescue is being commenced).

c) An "automatic controlled descent device" can be used as a self-rescue device if it is attached to a separate anchorage point (minimum 3,000 pounds strength) and a vertical tag line is attached to the controlled descent device's safety snaphook, which can be reached by the employee suspended in the full-body harness. The tag-line is pulled, bringing down the self-retracting lanyard from the controlled descent device, and the descent device safety snap is attached either to the dorsal, frontal, sternal or shoulder "D" ring(s) of the fully body harness, and the deployed energy absorbing lanyard detached (this method is only viable if there is a "quick release" device which will allow the disconnecting of the energy absorbing lanyard under tension). Once the deployed energy absorbing lanyard is disconnected from the fully body harness, the controlled descent device will allow the end-user to descend at a controlled rate to a lower level. This method requires "hands-on" training.

2. 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.
3. Government Emergency-Response Agency.
4. Jurisdictional Public Emergency-Response Agency.

8.6 Rescue Equipment Inspection

Inspection of equipment used by the jurisdictional public- and government-emergency response agencies is the responsibility of these agencies. Prior to use, the end-user shall inspect the self-rescue and assisted-rescue equipment to ensure that it is in safe working condition, and has been protected against damage from the weather (e.g., UV, water) and from workplace conditions (e.g., chemical, physical). Annually, a Competent Person for Fall Protection or competent rescuer shall verify that the rescue equipment markings and instructions are consistent with ANSI and OSHA Standards, and that the rescue equipment has been maintained in accordance with manufacturer's instructions.

8.7 Training Requirements for Rescue

Training is required for self-rescue techniques. All personnel who will work at height utilizing Fall Protection equipment shall be trained in self-rescue techniques. They shall be trained in these techniques before utilizing Fall Protection equipment and every two years thereafter.

a. **Specialized Training for the Rescuers.** Training of rescue personnel at jurisdictional public- and government-emergency response agencies are the responsibility of those agencies. For assisted-rescue, the authorized rescuers shall be properly trained and shall be proficient at performing a rescue of a person suspended in a full body harness or who has become incapacitated at heights. The authorized rescuer shall be knowledgeable in the selection, use, storage, and care of all equipment necessary to perform rescue on end-users from all types of Fall Protection equipment. Carefully evaluate hazards associated with rescue and determine whether or not it is safe to perform rescue. The CP shall conduct

a site-visit to the work location prior to writing a rescue plan. The CP must assign and delineate various responsibilities in the rescue and evacuation of an employee who has become incapacitated at heights and/or who is suspended in a full body harness after a fall. The CP must review and sign acknowledgement of plan. Authorized rescuer training and drill must be conducted once every two years. This training must be evaluated by a Competent Rescuer and shall include the following:

a) Fall Hazard recognition, elimination, prevention and control methods.
b) Applicable Fall Protection and rescue regulations and standards.
c) Understanding and using the "Fall Protection and Prevention Plan", and the "Rescue Plan".
d) Inspection and maintenance of the equipment including manufacturers' instructions.
e) Proper uses of various rescue equipment.
f) Practical applications and drilling scenarios for rescue (Hands-on Training).

8.8 Procedures for Requesting Rescue and Medical Assistance

The telephone number for jurisdictional public- and government-emergency response agencies is usually 911, or 9-911, depending upon the Navy or Marine Corps activity. If the emergency response number is different, it must be posted and publicized throughout the Navy or Marine Corps activity prior to personnel working at heights.

8.9 Transportation Routes to a Medical Facility

A sketch indicating the route to the nearest medical facility/hospital (a good practice is to highlight the route with a yellow marker) should be included in the fall-arrest rescue plan) and should be posted at the job-site.

8.10 Anchorages Used for Rescue

a. Anchorages selected and used for rescue systems only, including control descent devices shall be capable of sustaining static loads applied in the direction permitted by the rescue system of at least 3,000 lbs. (non-certified anchorage) or 5 times the foreseeable load (certified rescue anchorage). If the anchorage used for fall-arrest system is also used for rescue, it shall sustain the arrest load in addition to recue load, applied in the directions permitted by the personnel fall-arrest system per attached person.
b. Anchorage connectors used for rescue shall not be attached to anchorages where such attachment would reduce the allowable capacity of the rescue system.
c. Anchorage connections shall be stabilized to prevent unwanted movement or disengagement of the rescue systems from the anchorage. The rescue system shall be load-tested before a live load is placed on the system.
d. The anchorage should be located at a point above the rescuer to prevent swing fall.

8.11 Situational Rescue Equipment and Systems

The following are some of the equipment that activities can use to rescue a person incapacitated at heights or has fallen and is suspended in a harness, or can be used to permit a person suspended in a harness to stand and allow the necessary circulation of blood while an assisted rescue is being commenced:

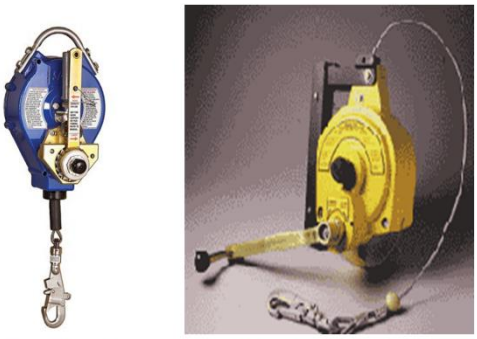
Self-Rescue and Assisted-Rescue Equipment:

a. **Evacuation Harness.** Evacuation harness is used only for rescue and shall be designed to fit properly and securely to hold the rescue subject during rescue. The harness shall, at a minimum, provide support for the body around the shoulders and thighs. Can be a viable option for confined space rescue if the entrance to the confined space will all the victim to pass through.

b. **Rescue Lanyard and Rescue Anchorage Connector Components** shall meet ANSI /ASSE Z359.4 Standard.

c. **Self-Retracting Device with Integral Rescue Capability.** Self-retracting devices with integral rescue capability shall meet the requirements of ANSI Z359.4 and ANSI Z359.14, and shall be capable of engaging into the rescue mode of operation at any time. It shall not be possible to stop automatically and hold the load if the rescuer intentionally or unintentionally relinquishes control. The intent of this mode of operation is that the device will not inadvertently change to or from rescue mode. The minimum mechanical advantage offered by the equipment in rescue mode shall be 3:1, neglecting frictional losses.

Self Retracting Lanyards w/Rescue Capability



Self Retracting Lanyard w/Winches for Rescue

d. **Synthetic Rope Tackle Block.** The rope tackle block shall have a minimum theoretical mechanical advantage of 3:1; and shall have a secondary means to prevent uncontrolled lowering of the worker. The rope used shall be made of synthetic material and shall have strength aging and abrasion resistance characteristics equivalent to or superior to polyamides.

e. **Descent Devices.** Descent devices designed for single use shall have a minimum descent energy rating of 30,000 foot-pounds. Descent devices designed for repeated or multiple uses shall have a descent energy rating of not less than 300 foot-pounds. The descent speed for automatic descent control devices shall be not greater than 6.6 feet/second or less than 1.6 feet/second. For manual control devices and or hand operated, the descent speed shall not exceed 6.6 feet/second.

f. **Other Rescue Equipment.**

Rescue Davit System

Rescue Y lanyard

Rescue lanyard

Ladder Used for Rescue

Safety Strap (require two Straps, (one for each leg)

8.12 Fall Rescue Plans

The Fall Rescue Plan should include the following Information as part of the Fall Protection and Prevention Plan:

a. Provide a detailed location of the work site, with any information that will help find the location, building number, floor number, etc. Post written directions that can be read over the telephone to an ambulance driver/police/fire department, or their dispatchers, on how to get to the site from the main gate of a facility. Give complete, accurate information to the rescue responder. Post a map at the job-

site, and highlight with a yellow marker, the route one should take from the site to the nearest hospital where someone with minor injuries can be treated expeditiously.

b. Indicate the location of the lift or other equipment that will be used in case of emergency, and the location of the key.

c. Provide the detailed location of the closest first aid kit. To assure that no time be lost looking for first aid kits during an emergency, post a site map marking the location of the first aid kits.

d. List emergency telephone numbers. If an emergency rescue is required, call the telephone numbers in the order listed; i.e., first, second, and third. Post written directions that can be read over the telephone to an ambulance driver/police/fire department or their dispatchers on how to get to the site from the main gate of the facility. Give complete, accurate information to the rescue responder.

e. Send an escort to meet the fire department upon arrival at the scene, and help them or the rescuer find the location of the accident.

f. Give the name of the person (the escort designated to meet the fire department upon arrival at the scene) and the back-up person (in case the designated person is injured) responsible to make the phone call in case of emergency.

g. Indicate names of personnel working at heights that may require rescue during the course of performing their jobs.

h. If self-rescue is used, indicate the type of self-rescue equipment available at the job-site, or which will be utilized during rescue operations.

i. Initiate a buddy system when personnel are working at heights and may require rescue. If the buddy system is not feasible, contact the activity to set up a visual or aural contact with the person exposed to Fall-Hazards every 15 minutes.

End of section

9 INSPECTION, MAINTENANCE, STORAGE, AND CARE PROCEDURES FOR PERSONNAL FALL PROTECTION EQUIPMENT

As stated in 29 CFR 1910, Subpart D, personal fall arrest systems must be regularly inspected. Any component of the system with significant defects must be removed from service immediately and shall be tagged or marked as unusable or destroyed. All Personal Fall Protection equipment shall be inspected before each use by the End User using sight and touch inspection method, in accordance with manufacturer's instructions or 3M PMS card. Prior to each use inspection means that the Fall Protection equipment shall be inspected by the end user at least once at the beginning of each eight hour shift in which it is used to verify that it has not sustained any wear or damage that would require its removal from service. The Competent Person for Fall Protection shall inspect the equipment using sight and touch inspection method at intervals of no more than one year or as prescribed by the manufacturer of the equipment. Most manufacturers recommend inspection of the equipment to be conducted twice annually by the Competent Person for Fall Protection. Inspection of the equipment by the Competent Person for Fall Protection shall be documented and the tag on the equipment shall be checked and dated by the Competent Person for Fall Protection on the date of inspection. All components and sub-components of the selected fall-arrest, positioning, and restraint systems shall be compatible.

9.1 Specific Equipment Inspection

9.1.1 Anchorage Systems (Anchorages and Anchorage Connectors)

a. Inspect each system component or subsystem according to associated manufacturer's instructions if applicable.
b. Observe any abrasions, wear points, damaged threads, or sags in the sling material before use. Inspect cable slings for excessive damage to the steel fibers. Refer to the tags to determine when the sling should be retired.
c. For synthetic slings and anchor straps, inspect all sewing and loops for wear, chemical damage, burn damage, and/or ultraviolet deterioration.
d. Inspect anchorage connectors for integrity and attachment to solid surfaces.
e. Inspect the anchorage connector hardware, including, wire rope, D-rings, and O-rings. These items must not be damaged, broken, distorted nor have any sharp edges, burrs, cracks, worn parts, or corrosion.
f. Inspect the anchorage connector webbing and stitching. The webbing must be free of frayed, cut or broken fibers. Check for tears, abrasions, mold, or discoloration. The webbing must be free of knots, excessive soiling, heavy paint build-up, and rust staining. Check for chemical or heat damage, indicated by brown, discolored, or brittle areas. Check for ultraviolet degradation, indicated by discoloration and the presence of splinters or slivers on the webbing surface. Check for pulled or cut stitches. Broken stitches may be an indication that the anchorage connector has been impact loaded and must be removed from service. All the above factors are known to reduce the strength of the anchorage connector. Damaged or questionable anchorage connectors must be removed from service.
g. On wire rope models, inspect cable for cuts, kinks, broken wires, bird-caging, corrosion, welding splatter, chemical contact areas, or severely abraded areas. Inspect ferrules for cracks or damage and inspect wire rope for corrosion and broken wires. Damaged or questionable anchorage connectors must be removed from service
h. Record the inspection date and results as appropriate

i. If inspection reveals an unsafe or defective condition, remove anchorage connector from service and destroy.

9.1.2 Snaphooks and Carabiners

a. Inspect on a regular basis and before each use.
b. Inspect snaphooks and carabiners for any hook, locks and eye distortion.
c. Verify that there are no cracks, pitted surfaces and eye distortions.
d. The keeper latch must not be bent, distorted, or obstructed.
e. Verify that the keeper latch seats into the nose without binding.
f. Verify that the keeper spring securely closes the keeper latch
g. Test the locking mechanism to verify that the keeper latch locks properly.
h. Verify that the points where the lanyard attaches to the snaphooks are free of defects
i. Retire snaphooks, carabiners, and all integral components if any discoloration, deformation, cracks, or abrasions are detected
j. Retire immediately if the item has sustained any fall, or if the spring is broken and gate is bent, or if the gatekeeper no longer engages the slot cleanly
k. Damaged snaphooks and carabiners shall be tagged and removed from service and from the inventory list
l. Dirty snaphooks and carabiners shall be cleaned with kerosene, WD-40 (or equivalent), or similar solvents, and immersed in boiling water for 30 seconds to remove the cleaning agent. Dry with a soft cloth to ensure that the gate and gatekeeper operate properly
m. Ensure that only double-locking-type gates are used.

9.1.3 Lanyards And Energy Absorbers

a. Inspect on a regular basis and before each use.
b. Perform inspection in accordance with manufacturer's instructions or PMS 3M card
c. Inspect lanyards put under a slight tension on a regular basis
d. Check all components for abrasion, cuts, discoloration, cracks, burns, knots, torn stitching and excessive wear
e. Visually inspect the energy absorber for any signs of damage, paying close attention to where the energy absorber attaches to the lanyard
f. Wash lanyards and energy absorbers on a regular basis to remove dirt and grit, which can abrade the fibers.
g. Lanyards and energy absorbers shall have a permanently attached labels indicating the manufacturer's name, serial number or lot number, date of manufacture, maximum elongation (deployment distance), maximum and average arresting force, maximum free-fall distance (6 or 12-foot free fall), and capacity. The lanyards and energy absorbers must also have permanently attached labels that indicate they meet OSHA & ANSI Z359.13 Standard and requirements.
h. Lanyards and energy absorbers shall be inspected by the user prior to each use and by a Competent Person for Fall Protection other than the user at least once a year.
i. Check for missing marking and labels.

9.1.3.1 Retire the Lanyard

a. If the lanyard has the impact indicator exposed
b. When the shock absorber (even if slightly) is impacted or deployed
c. If the lanyard has been used for any other purpose other than Fall Protection
d. If the equipment show excessive wear, chemical damage, burn damage, and/or ultraviolet deterioration

9.1.4 Fall Arrester (Rope Grab)

a. Inspect regularly.
b. Check for signs of wear, corrosion, rust, and other anomalies
c. If any sign of wear or malfunction is observed, remove the device from service immediately.

9.1.5 Self-Retracting Devices

a. Inspect before each use for any physical damage.
b. Inspection by a Competent Person for Fall Protection shall be in accordance with the manufacturer's instructions and recommendations. Inspection shall be documented.
c. If the Self-Retracting Device housing becomes yellow, gathers condensation, or the indicator has been engaged, remove it from service immediately, and return it to the manufacturer for repair and re-certification.
d. SRDs shall have permanently attached labels indicating that they meet ANSI Z359.14 and OSHA Standards and requirements.
e. Make sure that all back nuts or rivets are tight
f. Make sure that the entire length of the nylon strap is free of any cuts, burns, abrasions, kinks, knots, broken stitches, and excessive wear, and retracts freely.
g. Test the unit by pulling sharply on the lanyard to verify that the locking mechanism is operating correctly.

9.1.5.1 Additional Discussion

SRDs should be inspected prior to each use, and more thoroughly inspected by a CP annually. SRDs are returned to the manufacturer for service and recertification periodically based on manufacturers guidenance . Any equipment with many movable mechanical components or parts requires specialized inspection.

To determine if the SRD is in good and safe working condition, specialized testing and inspection must be conducted on the SRD. This includes opening the casing, inspecting the inner components of the SRL and the drum containing excess-spooled line, inspecting the locking mechanism, spring, connecting means, and fall indicator, and corrosion inspection in special environments. This is why only the manufacturer can inspect and certify the SRD.

Note:

SRDs are designated as Repairable or Non-repairable: Repairable Self-Retracting Devices shall be returned to the manufacturer for servicing and re-certification (Factory authorized inspection)

depending on the type, usage and the environment, in accordance with the following Inspection Requirements table:

TYPE OF USE	APPLICATION EXAMPLES	CONDITION OF USE	INSPECTION FREQUENCY BY COMPETENT PERSON	FACTORY AUTHORIZED INSPECTION
Infrequent to light use	Used in rescue, confined space, industrial (factory) maintenance	Good Storage conditions, indoor or infrequent outdoor use, room temperature, clean environments	Annually	At least every 2-5 years, but no longer than interval required by the manufacturer
Moderate to Heavy Use	Transportation Facilities, Residential/wood Construction, Utilities and Warehouses/Hangars	Fair storage Conditions, indoor and extended outdoor use, all temperature, clean or dusty environments	Semi Annually To annually	At least every 1-2 years, but no longer than interval required by the manufacturer
Severe conditions Continuous usage to	Commercial, Construction and industrial use, Shipyard environment	Harsh storage conditions, prolonged or continuous outdoor use, all temperatures, dirty environment	Quarterly to semi annually	At least annually, but no longer than intervals required by the manufacturer

All Factory Authorized Inspections of all Self-Retracting Devices shall not be longer than the intervals required by the manufacturer.

Utilizing SRD'S that require factory-authorized inspections and not sending them out to be inspected by an authorized manufacturer would be considered non-compliant with ANSI Z359 standards.

<u>Non Repairable SRDs</u> are designed and designated as Non-Repairable (not designed for disassembly). They are very basic in design and limited in length and use, made of synthetic webbing. Complete internal inspection is not possible without destroying or damaging the device. The Competent Person for Fall Protection shall work with written manufacturer's inspection requirements to determine

whether the device can be used or not. If the inspection is not possible, the device shall be taken out of service.

9.1.6 Full-Body Harness

a. Inspect per manufacturers, or 3M PMS requirements and before each use.
b. Inspect thoroughly and verify that there are no torn, frayed, broken fibers, pulled stitches, or frayed edges, anywhere on the harness
c. Closely examine all of the nylon webbing to ensure there are no burn marks from welding or heat sources, which could weaken the material
d. Examine D-ring for excessive wear, deterioration, or cracks.
e. Verify that buckles are not deformed, cracked, and will operate correctly.
f. Check to see that all grommets (if present) are secure and not deformed from abuse or a fall
g. Check tongue/straps for excessive wear from repeated buckling
h. All rivets must be tight, not deformed
i. Inspect for missing markings and labels
j. Ensure that harnesses do not have excessive paint or markings
k. Examine the harness for discoloration, abrasions and ultraviolet deterioration
l. Store harnesses in a cool, dry, and safe environment; ideally in a locked storage area
m. A Competent Person for Fall Protection, shall inspect the harness at least once a year.
n. Wash the harness in a mild soap and rinse multiple times to remove any soap residue, and hang to dry out of direct sunlight in a cool, dry environment.
o. The full body harness shall have a permanently attached label indicating manufacturer's name, serial number or lot number, date of manufacture, capacity, and that it meets OSHA & ANSI Z359.11 Standard.

9.1.7 Ropes (Synthetic Fibers)

a. Inspect rope periodically for broken fibers, severely worn areas, or change in the consistency of the core; inspect under slight tension and check for soft areas, bulges, or excessive stiffness.
b. Avoid exposing rope to hazardous chemicals, moisture, acids, or oils.
c. Do not use the rope after it is impacted or damaged.
d. Wash the rope on a regular basis with lukewarm water and mild detergent to remove dirt or grit, rinse several times to remove soap residue, and hang in a dry, cool, dark area.
e. Store rope in a strong weatherproof bag. Rope always must be dry before being placed in storage.
f. Rope shall have a permanently attached label indicating manufacturer's name, serial number or lot number, date of manufacture, capacity, and that it meets OSHA & ANSI Z359 Fall Protection Code/Standards requirements.

9.1.8 Climbing Ladder Fall Arrest System (Ladder Climbing System)

a. Inspect on a regular basis per equipment manufacturer's requirements or PMS Maintenance requirements.
b. The sleeve must run freely to ascend or descend without hand operations or guidance.
c. Check cable and rails for abrasions, wear, looseness, and cracks.
d. Before climbing, check integrity of cable, system, and ground level.

9.1.9 Raising/Lowering Devices (Rescue)

a. Inspect before each use.
b. Check for wear and corrosion.

9.1.10 Horizontal Lifeline

a. Inspect the system including anchorages, anchorage connectors, cable and other hardware for defects or loose components similar to inspection of other fall-arrest system components. The end-user shall inspect the components of the system prior to each use.

a) **Type 1 HLL system**, the Competent Person for Fall Protection shall inspect the system at an interval of no more than one year under the direction of a Qualified Person for Fall Protection.
b) **Type 2 HLL System** shall be inspected once a year by the Competent Person for Fall Protection who is trained by the manufacturer of the system to perform such inspections and under the direction of the Qualified Person for Fall Protection.

9.1.11 Additional Information

a. In the event of a fall, secure all equipment involved and contact the Safety Officer for disposition. Do not reuse safety equipment that has experienced a fall
b. In the event of a fall, the first response is to ensure the safety of the employees. After rescue and, if required, medical aid is provided, all equipment involved must be removed from service. The Navy or Marine Corps Activity Safety Office must be contacted.
c. During inspection of the equipment by the Competent Person for Fall Protection, only mark on the labels. Some manufacturers permit marking on straps using certain types of permanent markers, which are water resistant and quick- drying such as Sanford Sharpie Permanent Markers. Always consult the manufacturer or PMS maintenance requirement card for marking on the equipment
d. Care and Maintenance of the Equipment:
a. Always consult manufacturer's instructions/PMS maintenance system and recommendations for care and maintenance of the equipment.

9.2 Fall Protection Equipment Inspection Checklist

See Appendix M.

9.3 Fall Arrest System and Equipment Checklist

See Appendix N.

End of section

10 ANCHOR CONSIDERATIONS, SELECTION OF SAFE ANCHORAGES AND FALL ARREST SYSTEM CONSIDERATIONS

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 during maintenance work. If needed, properly planned and designed anchorages used during construction work may also be used afterward during maintenance, provided they are installed and properly located for performing the maintenance task. Most of the time such anchorages used during construction phase may not be suitable for use during maintenance phase.

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 shall 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) shall be replaced with a stronger one in order to maintain the appropriate maximum characteristics in compliance with the International Building Code and design criteria documents.

Lanyards shall not be connected to themselves or to other lanyards unless permitted by the manufacturer.

Knots shall not be tied in lanyards, lifelines, or anchorage connectors (i.e., anchor straps). Tie-off using a knot in a lanyard, lifelines, or anchorage connectors can reduce the strength by 50% or more.

Tying a rope lanyard or lifeline around rough or sharp edges such as beams, columns or other surfaces may reduce the strength of the line due to cutting action of the sharp edge. If a line is cut or damaged, it will drastically affect the design reaction of the system during a fall. Such tie-off should be avoided or alternate rigging method should be used. As an alternate, use beam clamp, wire rope, effective padding, or abrasion-resistance strap (chaffing protection) around or over the sharp or rough surfaces.

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 shall not exceed six 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 shall reflect this restriction.

Anchorage Points shall 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.

The strength of an eyebolt is rated along the axis of the bolt and its strength is greatly reduced if the force is applied at an angle to this axis (out-of- the-plane of the eye). In addition, the diameter of the eyebolt should be compatible to snaphook or carabiner attachment. Non-rotating rings should be avoided, since falls rarely occur directly along the axis of the eyebolt. Where possible, rotating rings (swivel rings) with full motion in the three axes should be used to increase the angle with the axis to more than 45 degrees. The ring will then be able to automatically align along the direction of force. Swivel rings used as anchorages in a fall arrest system shall be properly sized. The eyebolt used in the Fall Protection system shall be forged steel. Effort shall be made to minimize the angle between the axis of the eyebolt and the direction of the pull.

Attaching two snaphooks to the same anchorage: ANSI Z359.18 Standard for anchorage connectors only supports one system (one connecting point) per user.

10.1

Horizontal lifelines, depending on their geometry and angle of sag, may be subjected to greater loads than the impact load imposed by an attached component. When the angle of sag for the horizontal lifeline is less than 30 degrees, the impact force generated is greatly amplified. For example, with a sag angle of 15 degrees, the force amplification is about 2:1 and at 5-degree sag, it is about 6:1. Depending on the angle of sag, and the line's elasticity, the strength of the horizontal lifeline and the anchorages to which it is attached should be increased a number of times over that of the lanyard. Extreme care should be taken in considering a horizontal lifeline for multiple tie-off. The reason for this is that in a multiple tie-off to a horizontal lifeline, if one employee falls, the movement of the falling worker may cause other employees to also fall. Horizontal lifeline and anchorage strength should be calculated for each additional employee to be tied-off. For these and other reasons, horizontal lifelines shall only be designed, selected, and certified by Qualified Person for Fall Protections. Inspection of installed horizontal lifelines and anchors before use is recommended.

The following are some considerations when evaluating horizontal lifeline systems:

a. Review the design calculations of the system
b. Review manufacturer's test data of similar systems

The anchorage and anchorage connector shall be compatible.

When tying off to a beam or column, do not attach the anchorage connector to a hole in the beam unless evaluated by a Qualified Person for Fall Protection, because the forces generated by a fall will weaken the beam structure. Do not drill a hole for tying off, as this attachment will weaken the beam strength. The most favorable way to tie-off is to use an anchorage connection to wrap around the beam or column, such as an anchor strap, or use a designed beam clamp.

Do not tie a knot in the anchorage connection.

The most favorable location to anchor to a beam is in the center of the span. This action will distribute the forces evenly at the supports. The closer anchorage point is to the beam support, the shear-force of

a fall on the structure will increase accordingly. However, when anchoring to the beam always consider the hazard of swing fall effect.

Take into consideration the impact of shear forces at the supports and the bending moment distribution of forces beyond the supports into other structural members.

In the selection of a point of anchor in a column, take into consideration the effect of all forces due to axial loading and bending stresses.

Refrain from welding the anchorage connection to the anchorage, unless the welding is performed and certificated annually by a certified welder.

When using nails to install roof anchors, the number, type, and size of nails used to attach the component to a wood structure shall be in accordance with the building code requirements. Verify that the roof anchors are attached to structural members, rather than decking only.

In selection of anchorage location, take into consideration the accessibility and ease of securing or attaching to it (ease of tying off).

When attaching of the fall-arrest system to a concrete slab, make sure the concrete is strong and thick enough to sustain the static and dynamic loads of the fall forces. The bottom steel reinforcement in the concrete slab is usually under tension. Plain concrete is very weak under tension, unless re-enforcing steel bars are embedded in concrete.

10.2 Fall-Arrest System Considerations:

Prior to selecting a fall arrest system, the following information should be verified and considered:

a. Movement of the worker
b. Existing obstructions in the worker's path
c. Location and availability of safe anchorages
d. Total fall distance, free fall distance and available clearance
e. Possibility of swing fall hazards
f. Compatibility of all components of the system
g. Impact forces
h. Availability of rescue/self-rescue

End of Section

11 RESPONSIBILITY FOR DESIGN, INSPECTION, CERTIFICATION, AND RE-CERTIFICATION OF ANCHORAGES

Anchorages can be either engineered or improvised. An anchorage system is a combination of anchorage point (rigid part of the structure) and anchorage connector. Improvised fall-arrest anchorages and anchorage connectors shall withstand a force of 5,000 pounds for every person attached to the system. Positioning anchorages shall withstand a force of 3,000 pounds and restraint anchorages shall withstand a force of 1,000 pounds (Per ANSI Z359.2 standard). Anchorage connectors are usually designed and prefabricated by a manufacturer under the supervision of a Qualified Person, and meet OSHA and ANSI standards. The certification and re-certification of anchorage connectors can be performed by the manufacturer or Qualified Person.

11.1 Anchorage Identification, Design, Certification and Re-Certification of Active Fall Protection Systems

a. Certified anchorages should be designed before use by a registered professional engineer with experience in designing personal fall-protection systems and installed by another Qualified Person for Fall Protection with appropriate education and experience or by a competent person for Fall Protection under the direction of the Qualified Person for Fall Protection. If an anchor point from existing structures such as beams, or hoist ring designed for construction applications, is needed, a Qualified Person for Fall Protection should be used to evaluate these anchorages.

b. Required fall-arrest system anchorages shall be capable of supporting 5,000 pounds per employee attached; or the required anchorages shall be designed for twice the maximum arrest force as part of a complete fall-arrest system, installed, and used under the supervision of a Qualified Person for Fall Protection.

c. A Qualified Person for Fall Protection should be able to calculate the forces generated by arresting a fall; total loading; impact on the structural members the line is attached to; and determine the optimal and safe location where and how to tie-off. The Qualified Person should have the knowledge and be capable of designing, certifying, supervising, approving, and rating the required anchorage/tie-off points.

Note:

For Fall Protection anchorages loading, selection and approval, contact a Qualified Person for Fall Protection: Due to the variability in the structural strength of different materials, before using an anchorage point, a Qualified Person for Fall Protection must be contacted to ensure that the anchorage meets/exceeds regulatory requirements.

d. For recertification of Active Fall Protection systems, the Qualified Person or the engineer of record shall specify the frequency of re-certification, but not to exceed five years.

11.2 Inspection, Certification and Re-Certification of Anchorages

a. Inspection: Fall-arrest, positioning, and restraint equipment shall be inspected by the End User before each use, and by a Competent Person annually, and in accordance with the manufacturer's instructions. Workers are not qualified to inspect anchor points; however, they should be trained to pay special attention to any cracks developing around the anchor points, or if the anchor points are unstable

or loose. End-users shall not tie-off to unsafe anchorages and they should bring it to the attention of the Competent Person for Fall Protection if such a situation exists. The manufacturers of the Fall Protection equipment/systems shall indicate in the supplied manufacturer's instructions the methods of inspection and durations. Any components of the system not addressed by the manufacturer's inspection requirements (e.g., anchorages), shall be visually inspected in a manner and frequency specified by the design engineer.

b. Certification and Re-Certification of Anchorages: Anchorages should be field-verified by a Qualified Person for Fall Protection. ANSI Z359 Fall Protection Code/Standards addresses certification of anchorage connectors. It does not address certification of anchor points (rigid part of the structure). A registered professional engineer who is trained as a Qualified Person for Fall Protection can certify the structural integrity of the anchor points. Depending on the design, type, location, and the size of the structural member to which the anchorage is connected, the environment and weather conditions dictate how often such anchorages shall be inspected and re-certified by a Professional Engineer or a Qualified Person for Fall Protection.

c. Recertification of Active Fall Protection System: The design of FP system shall be thoroughly reviewed by a Qualified Person for Fall protection who is qualified in designing Fall Protection systems. The original design of the system should have indicated the frequency of the recertification criteria. The period of recertification shall not exceed five years. Recertification process shall include:

1. Review of the original design
2. Any changes in the hazards or tasks performed
3. Changes in regulations or standards
4. Any other factors affecting the system

End of Section

12 BEST FALL PROTECTION PRACTICES FOR AIRCRAFT MAINTENANCE AND INSPECTION WORK

12.1 Introduction

The aviation community is subject to falls from aircraft while performing various maintenance procedures while working at heights. The following information is designed to provide information and best practices to assist personnel in the mitigation of risks from working at heights and help to ensure the safety of all personnel who perform aviation maintenance and inspection work at the organizational, intermediate, and depot levels.

12.2.1 Applicability

The information in this chapter is applicable to all Navy and Marine Corps Military and Civilian personnel worldwide involved in aircraft maintenance and inspection work where personnel are exposed to the hazard of falling from heights and/or there is a need for Fall Protection.

12.3 Purpose

The purpose of this Chapter is to provide administrative tools, and safe work practices to mitigate fall hazards when conducting aircraft maintenance or inspections. Naval Aviation, maintenance, inspection and aircraft wash-downs are considered maintenance tasks under the Naval Aviation Maintenance Program (NAMP).

12.4 Written Fall Protection Program

See chapter 2 of this document and OPNAV M-5100.23 chapter 13 for guidance/policy on developing a written FP program.

12.5 Fall Protection Systems and Equipment Used for Aircraft Maintenance and Inspection Work

Fall Protection methodologies, equipment and systems are all parts of the overall hazard analysis and Fall Protection and prevention plan for aviation maintenance / inspection evolution. Location of the aircraft or potential fall exposure, nature of the task, environmental conditions, work area of the aircraft or working platform, and consideration for other potential hazards that may be introduced with the use of Fall Protection, must be considered for each task. Consideration must be given to all hazards encountered with the execution of a particular maintenance or inspection task, to determine the best and safest course of action.

The following paragraphs are examples of the types of Fall Protection systems that can be employed for aircraft maintenance and inspection, in cases where fall hazards cannot be eliminated. They are listed in accordance with the hierarchy of controls, stated in Chapter 13 of OPNAV M-5100.23, and Chapter 5 of this guide. For more details on Fall Protection equipment and systems, see Chapter 6 and 7 of this guide. Navy and Marine Corps activities must determine those Fall Protection measures which must be employed to mitigate fall hazards based on a risk analysis of the work or inspection to be performed:

12.5.1 Mobile Work Platforms and Mobile Man Lifts (Prevention, Engineering Controls)

Where work is performed from elevated work platforms four feet or higher, the work platforms shall be equipped with a standard guardrail and safe method of access, or other Fall Protection system that mitigates potential fall hazards. Mobile servicing platforms are authorized, but shall be required to provide additional Fall Protection equipment per the manufacturer's specifications. Work platforms shall comply with OPNAVINST 5100.23/5100.19 (series), OSHA 29 CFR 1910 and COMNAVAIRFORINST 4790.2 (series).

Mobile Work Platform (MWP) and Mobile Man Lift (MML) provide powered access from self-propelled elevating platforms, which are approved as Ground Support Equipment.

12.5.1.1 Mobile Man Lifts (MML)

The MML was specifically procured for support to MV-22 and E-2Ds but operating range lends itself to support several aircraft of that size.

Mobile Man lift (MML) in non-powered and is authorized a peculiar SE for MV-22 and E-2D

Mobile Man lift (MML) provides tremendous utility as platform has telescopic extension

WARNING

MML are equipped with anchor points. All occupants of an MML must utilize Harness and Lanyards for restraint. Lanyards shall be attached to authorized anchor points IAW MFR instruction and/or NAVAIR Technical Manual

12.5.1.2 Mobile Work Platforms (MWP)

Mobile Work Platforms (MWP) are Ground Support Equipment (GSE) that come in two configurations a diesel and an electric model. The MWP A/S-32M-2 are manufactured by Grove.

MWP A/S-32M-2 in use on P-3

WARNING

MWP's are equipped with anchor points. All occupants of an MWP must utilize a Harness and Lanyard for restraint. Lanyards shall be attached to authorized anchor points IAW MFR instruction and/or NAVAIR Technical Manual

12.5.2 Ground Support Equipment (GSE) (Prevention/Engineering Control)

GSE includes the B Series stands that were designed in the 1950s to provide safe access to a variety of airframes. This includes the B-1. B-2, B-4, B-5, and B-7 stands.

CAUTION

Many of the B-Series stands are not OSHA compliant and provide inadequate Fall Protection if guardrails are removed or if swing gate across ladder way is not installed.

NOTE

PMA-260 has issued two Technical Directions (TD) for installation of self-closing swing gates on B series stands to make stands OSHA complaint.
The first TD, ISEC 5973 for B-1stands was supported with procurement of 859 Double swing gates, that were delivered to custodians from 2012-2014. The second TD, ISEC 5974, is for B-4 stands and 1401 swing gates were delivered for compliance with TD.

CAUTION

Guardrails on many B-series stand may be removed to facilitate work on the aircraft. When a Guardrail is removed to facilitate work, that leading edge shall be placed as close to the aircraft as possible and stand raised to reduce gap to no more than 19 inches to minimize the potential fall exposure.

CAUTION

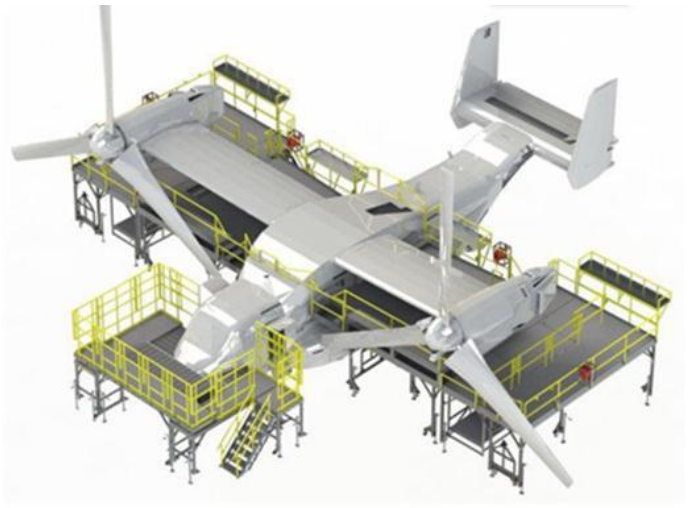
Midrails and Top Rails of maintenance stands are not to be used as additional ladder steps

CAUTION

B-Series stands have a capacity limit clearly marked on its side. Do not overload stands with toolboxes and excess personnel.

12.5.3 Phase Stands (Prevention, Engineering Control Measures)

Phase Stands are specific to the T/M/S and many be referenced in maintenance manuals. After market phase stands or modified phase stands should be identified as a special tool in the Fall Protection Program. Additionally, a lifecycle plan should be created that includes Maintenance Requirement Cards and Pre-Op Cards.



Phase Stand

12.5.4 Warehouse Stands and Scaffolding (Administrative Procedures/Safe Access)

Warehouse stands and scaffolding provide means of access and some level of protection from fall. Scaffolding is more likely to be found at Depot level maintenance facilities. If these stands are used at the Organizational level, stands should be accounted for as a special tool in the Tool Control Program. Additionally, a lifecycle plan should be created that includes Maintenance Requirement Cards and Pre-Op Cards.

Warehouse Stand

12.5.5 Ladders (Administrative Procedures)

Portable Ladders - Provide means of access but no means of Fall Protection. There are three types of ladders that appear in the aviation community.

a. Authorized Aircraft Ladders such as the Little Giant IAA
b. Ladders that have been authorized as a Special Tool such as the types discussed earlier
c. Unauthorized Ladders

WARNING

Do not stand on top two steps of self-supporting ladder (A Frame ladder)



CAUTION

Do not face away from the ladder. Keep ladder perpendicular to work area.


12.5.6 Integrated platforms (Working surface/Administrative Control)

Some aircraft are equipped with areas that are integral to the aircraft and provide a means for maintenance personnel to have a place to work. Additional Fall Protection may be required. Some examples are:

a. MV-22 nacelle doors that fold out to provide a working surface
b. MH-60R/S clam shell doors that allow access to engines
c. MH-53

CAUTION

Integrated platforms have a capacity rating that should not be exceeded.

12.5.7 Integrated Steps

Integrated steps provide access but do not provide fall protection.

CAUTION

Utilize a ground spotter when utilizing aircraft boarding ladders such that in the event of a fall they may be able to prevent significant head strike on deck.

12.5.8 Air surfaces - Improvised working surfaces

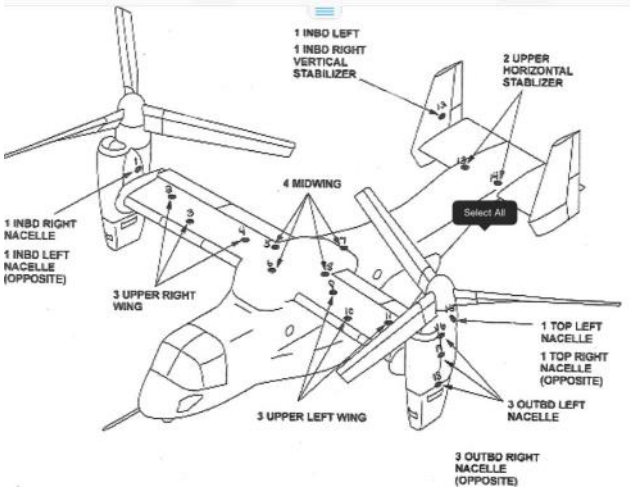
The vast majority of the work at height that must be performed especially on flight lines is performed atop the wings, fuselage or tail section. Lines of demarcation are in many cases located between the do not step warnings and the nonskid locations.

12.5.9 Restraint System (PPE)

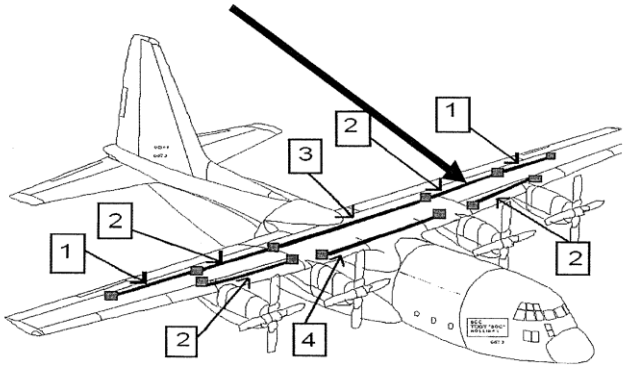
A system consisting of equipment and components connected together designed to restrain a person from reaching an exposed fall hazard. Restraint system is also referred to as travel restraint.

12.2.9.1 Integrated Restraint Systems

Airframes where anchorages are built directly into airframe. Some examples are the MV-22, E-2D and the H-60.



USE ONLY THE CABLES APPROPRIATE FOR TASK, i.e. 130 ISO WOULD ATTACH ALL CABLES, WORKING AROUND ENGINES WOULD ONLY REQUIRE SET(S) RUNNING ON THE TRAILING EDGE BETWEEN ENGINES.



Attach appropriate cable lengths at points indicated with matching number.

Cable number		Cable lengths
1	-	17' 7''
2	-	17' 2''
3	-	34'
4	-	30'

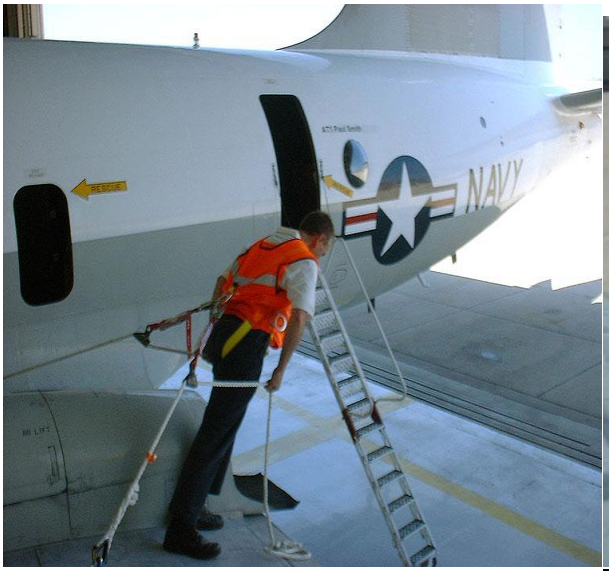
Travel Restraint system installed on AFSOC C-130s post flight to provide protection atop of aircraft.

12.5.9.2 Vacuum System

Vacuum systems make use of an anchor connector that creates a vacuum between the vacuum system and the skin of the airframe to establish an anchorage. Systems are lightweight and effective; however, are designed engineered systems that current ANSI standards do not cover. Therefore, documentation from the manufacturer is required that meets the requirements set forth in OPNAV M-5100.23 Series, Chapter 13.

NOTE:

MACCLOGWING in coordination with PMA-231 has gained authorization for use of this system for E-2 and C-2s.



WARNING

Vacuum systems may only be utilized with permission of cognizant PMA and should be done in consultation with the airframe manufacturer.

WARNING

Vacuum systems may only be utilized in a restraint configuration at present time

WARNING

Vacuum systems are designed FP systems. Only connectors and lanyards provided with system may be utilized.

12.5.10 Personal Fall-Arrest System (PPE)

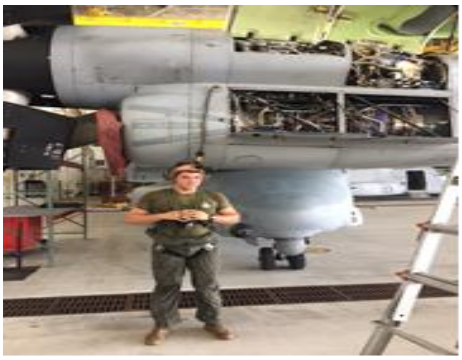
WARNING

If Personal Fall Arrest System (PFAS) is used a rescue plan must be in place.

WARNING

Safety Belts (body belts) shall not be used as part of personnel fall arrest system

On MV-22 Do Not, use restraint/arrest system on forward nacelle when aircraft is in stowed position. The clearance height from the deck is greatly reduced and in the event of a fall, injury to part of the lower leg is likely.



12.5.10.1 Mobile Fall Arrest Systems – Single Point and Rail systems

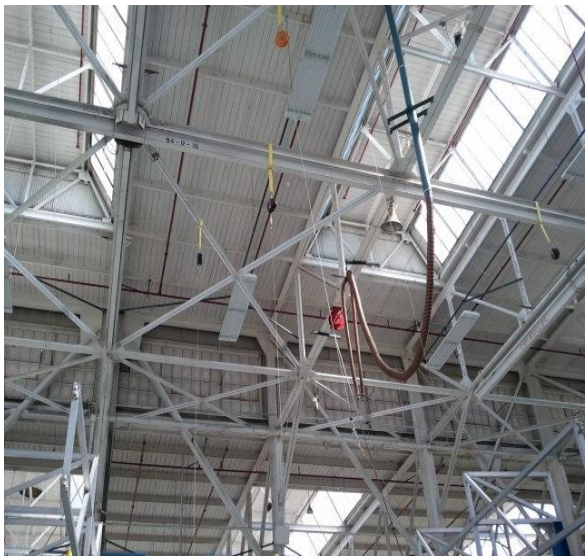
There are numerous options available for mobile anchor points. The system design varies widely and allows for single users or multiple users depending on design limitations. These units are found extensively at depot facilities and may be available at the Organizational level.

NOTE:

Hundreds of portable rail systems were procured by CNAF and provided primarily to Fleet Replacement Squadrons (FRS). These stands were to be identified as Special Tools and tracked

12.5.10.2 Overhead Anchor Points and Rails in Facilities

These may be improvised anchor points as selected by a Competent Person for Fall Protection or a designed system attached to the structure. This may include systems installed on wash rack structures



Overhead Beam Strap with Self Retracting Lanyard

WARNING

Ensure the structure has the required strength if anchors are selected

NOTE:

Commercially available engineered systems are recognized as effective Fall Protection and may be used. Commercially available engineered systems shall be designed, installed, certified and used under the supervision of a Qualified Person. The systems shall be used per manufacturer's instructions and recommendations. The CP for FP may (if deemed appropriate by the Qualified Person), may supervise the assembly, disassembly, use, and inspection of the engineered system, under the direction of the QP.

NOTE

The design shall include drawings, required clearance, and instructions on proper installation, use, and inspection requirements.

12.5.10.3 Horizontal Lifeline Systems

WARNING

HLL Systems must be inspected IAW the stamped installation drawings or annually by a Qualified Person

WARNING

A cranial IS NOT Fall Protection. In the event of a fall, cranials do not prevent a person from contacting a lower level or object. For head protection, the advanced cranial prototypes attenuate a significantly greater amount of impact energy as comparable to a Z10 hardhat.

End of Section

REFERENCES

a. OPNAVINST 5100.23 Series, Navy Safety and Occupational Health Instruction; Chapter 13, Fall Protection Program
b. OPNAV M-5100.23 Series, Navy Safety and Occupational Health Program Manual; Chapter 13, Fall Protection Program
c. OPNAVINST 5100.19 Series Navy Safety and Occupational Health Program Manual for Forces Afloat; Chapter 13, Fall Protection Program
d. MCO 5100.29 Series Marine Corps Safety Program
e. NAVMC DIR 5100.8 Marine Corps Occupational Safety and Health (OSH) Program Manual: Chapter 18 Fall Protection Program
f. US Army Corps of Engineers (USACE), Safety and Health Requirements Manual, EM 385-1-1, current edition; shall be included and enforced on all DOD contracts involving construction, dismantling, demolition or removal work. Contractors performing such work shall comply with all pertinent provisions of the latest version of the manual (FAR 52.236-13 Accident Prevention)
g. 29 CFR 1926.500, Subpart M, Fall Protection Requirements in the Construction Industry
h. 29 CFR 1910, Occupational Safety and Health Standards for General Industry, Subpart D, Walking Working Surfaces
i. 29 CFR 1910.140 Subpart I Personal Fall Protection Systems
j. 29 CFR 1915, Occupational Safety and Health Standards for Shipyard Employment
k. 29 CFR 1917, Marine Terminals
l. 29 CFR 1918, Safety and Health Regulations for Long-shoring
m. 29 CFR 1960, Basic Program Elements for Federal Employee Occupational Safety and Health Programs
n. Department of Defense Directive 6055.1, Occupational Safety and Health Program
o. American National Standards Institute (ANSI)
p. ANSI/ASSP Z359 Fall Protection Code/Standards, (See Appendix A for description of these standards)
1. ANSI/ASSP A1264.1 (R2007): Safety Requirements for Workplace Walking/Working Surfaces and Their Access, Workplace Floor and Wall Openings, Stairs and Railing Systems
2. ANSI/ASSP A14.3 (R2008) Safety Requirements for Fixed Ladders
3. ANSI/ASSP A10.32 (2012) Personal Fall Protection Used in Construction and Demolition Operations.

GLOSSARY

- **Activation Distance.** The distance traveled by fall-arrester or the amount of line paid out by self-retracting lanyard from the onset of a fall to the point where the fall arrester of self-retracting lifeline begins to apply a braking or stopping force.
- **Active Fall Protection system.** A Fall Protection system that requires end-users to wear or use Fall Protection equipment and that requires Fall Protection training. Active Fall Protection systems can include any travel restraint or fall arrest systems.
- **Adjuster.** A component that provides a means to enlarge or shorten the length of strap, webbing or rope.
- **Administrative Controls.** Policies and procedures for safe work practices. This may include training, warning lines/signs or other methods to warn a person approaching a fall hazard.
- **Anchorage.** A secure connecting point or terminating component of personal Fall Protection system that can safely withstand the forces exerted by the activation of Fall Protection and rescue equipment. The anchorage is a secured 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 Subsystem.** A subsystem of a complete active Fall Protection system to which workers connect their personal equipment.
- **Anchorage System.** A combination of anchorage and anchorage connector.
- **Arresting Distance.** The total vertical distance required to arrest a fall. Includes activation and deceleration distance. Arresting distance does not include free-fall distance.
- **Arresting Force.** The force exerted on a worker, when a Fall Protection System stops the fall. The magnitude usually expresses the peak force experienced during a fall.
- **Arrest Load**. The fall force exerted on the anchorage.
- **Assigned Safety Person (Spotter).** An employee assigned to continually assure visually or verbally that an end-user has not fallen and is suspended in his/her harness. This assigned safety person shall have the ability to make quick contact with the jurisdictional public/Government-emergency response agency. This is also known as the "Buddy System".
- **Assisted Rescue.** A planned means of rescue, requiring the assistance of others.
- **Attachment Element Extender.** Often also called a D-ring extender; a small lanyard temporarily or permanently attached to a harness intended to extend the attachment element away from the user's body to facilitate ease of attachment.
- **Authorized Person.** See the definition of End-user.
- **Authorized Rescuer.** A person who is trained on rescue procedures and assigned by the Command/Activity to rescue end-user who may require rescue.
- **Automatic Descent Control Device.** A load lowering device or mechanism that once engaged will automatically control payout speed of line or descent speed under load. Some automatic controlled descent devices have self-retracting lanyard capability.
- **Available Clearance.** The distance from the walking working surface or platform to the nearest obstruction that the end-user might contact during a fall.
- **Back-Strap.** A strap located on the back of a full body harness (FBH) that connects between the straps below the dorsal location and above the waist, which is intended to keep the body from exiting the rear of the harness.

- **Ballasted Anchor.** An anchorage connector that rests on, but not mechanically connected to an underlying structure.
- **Body Belt.** A body support comprised of a strap with means for securing it about the waist. **(Use of body belt in a personal fall-arrest system is prohibited).**
- **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 personnel fall-arrest system. Full-body harness is the only body support device allowed by OSHA or ANSI when a free-fall distance exceeds two feet.
- **Boatswain's (Bosn) Chair.** A single-point adjustable suspension scaffold consisting of a seat or strap designed to support one employee in a sitting position. The seat is made of a plywood or strap independently suspended from an anchorage, and the employee, using full-body harness attached to a separate lanyard or lifeline attached to an independent anchorage, may sit to help alleviate the pooling of blood in the legs.
- **Brake Bar Rack.** A series of smooth bars connected together in parallel in which a synthetic rope is inter-twined so that the friction of the rope against the bars controls the descent of a lowering device (often used in a rope rescue system).
- **Buckle.** A connector used for attaching the strap or webbing segments together or to themselves.
- **Cable Grab.** See fall-arrester.
- **Cable Guide.** A device that acts to guide or connect flexible carriers to the climbing ladder or structure at intermediate points along the carrier. Cable guides may be automatically by passable or may require the climber to remove the carrier cable from the guide before passing.
- **Cage.** An enclosure mounted on the side rail of a fixed ladder or fastened to a structure behind the fixed ladder that is designed to surround the climbing space of the ladder.
- **Capacity.** The maximum weight that a component, system, or subsystem is designed to hold. This includes combined weight of the user, clothing, tools and other objects carried by the end user.
- **Carabiner.** A connector component generally consisting of an oval- or trapezoidal-shaped body with a closed gate or similar arrangement that may be opened to attach another object and when released automatically closes to retain the object. **Only self-locking carabineers are acceptable for use.**
- **Carrier.** The specified track of a climbing ladder fall arrest system consisting of a flexible or rigid member upon which the carrier sleeve travels. The carrier is secured to the climbing ladder or structure by carrier mounting brackets. The carrier may be continuous or may contain joints or splices.
- **Carrier Gate.** A specific portion of the carrier designed to allow removal and installation of the carrier sleeve on or of the carrier. Carrier gates may be located at any point along the Climbing Ladder Fall Arrest System carrier but are most commonly located at the top and bottom of the system or at an intermediate entry/egress point.
- **Carrier Mounting Brackets.** Elements of a climbing ladder fall arrest system that connects the carrier to the climbing ladder or structure. Top and bottom brackets for flexible carriers and intermediate brackets for rigid carriers are examples of carrier mounting brackets.
- **Carrier Sleeve (climber safety sleeve).** The device of a climbing ladder fall-arrest system that is connected to the user and travels along the carrier in response to climbing movements but automatically stops on the carrier in the event of a fall. Carrier sleeves are sometimes referred to as "cable grabs" for flexible carriers.
- **Carrier Stop.** A device fitted to the carrier to prevent the carrier sleeve from unintentionally passing a specific point or becoming detached from the carrier. Carrier stops may or may not be subject to fall arrest loading depending on location. Some system carrier mounting brackets may function as a carrier stop.

- **Certification.** The act of attesting in writing that the established criteria have been met.
- **Certified.** An act or process resulting in documentation that determines and attests to criteria that meet the requirement of ANSI Z359 Standards. Such act or process may be carried out by testing or applying proven analytical methods, or both, under the supervision of a Qualified Person for Fall Protection or other entity (i.e. Professional Engineer).
- **Certified Anchorage.** An anchorage for 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.** The distance from a specified reference point, such as the working platform or anchorage of a fall-arrest system, to the lower level that a worker might encounter during a fall.
- **Clearance Requirement.** The distance below the end user, that must remain clear of obstructions in order to ensure that the End User does not encounter any object or obstruction during a fall.
- **Climbing Extension.** A specialized carrier-mounting bracket of the climbing ladder fall arrest system that extends the system carrier above the top step or rung of the climbing ladder for purposes of transitioning on or off the climbing ladder.
- **Climbing Ladder.** A climbing surface that includes rungs, step bolts, or similar foot and handholds that can be climbed while maintaining three points of contact, which is part of or affixed to a structure.
- **Climbing Ladder Fall Arrest System.** An assembly of components whose function is to arrest the fall of a user. The system includes the carrier, carrier mounting brackets and the carrier sleeve. The carrier is securely attached to the climbing ladder or to the immediately adjacent structure.
- **Competent Person (CP) for Fall Protection.** A person designated by the Command to be responsible for the immediate supervision, 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 Protection and rescue system, or any component thereof, AND who has the authority to take prompt corrective measures to eliminate or control the hazards of falling.
- **Competent Person Trainer.** A person who by training, knowledge and experience is capable of conducting a Competent Person for Fall Protection training.
- **Competent Rescuer.** An individual designated by the employer who by training, knowledge and experience is capable of the implementation, supervision and monitoring of the Command/Activity Fall Protection rescue program.
- **Competent Rescue Trainer.** A person who by training, knowledge and experience specific to Fall Protection rescue is capable of conducting rescue training.
- **Connecting Means.** The method to connect body support to an anchorage, such as a lanyard, snaphook or a carabiner for the purpose of providing protected mobility for an elevated work task.
- **Connecting Subsystem.** An assembly, including the necessary connectors, comprised of components, subsystems or both, between the anchorage connector and the D-ring of body harness.
- **Connection Linkage.** A connector or a combination of elements, which is integral to the carrier sleeve, and which forms the link between the carrier sleeve and the attachment element of the full body harness.
- **Connector.** A device used to couple (connect) parts of the personal Fall Protection system together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or D-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).
- **Continuous Fall Protection.** One or more Fall Protection systems that provide Fall Protection without interruption.

- **Controlled Access Zone (CAZ).** A zone to restrict access to unprotected edge work. The CAZ is bounded by a control line and should run the full length of the unprotected edge and connect on each side to a guard or wall. The control line can be made of rope, wire, tape, or equivalent material and shall be supported by stanchions and marked with a highly visible material. **(The use of controlled access zone is prohibited as a Fall Protection system).**
- **Dangerous Equipment.** Means equipment, such as vats, tanks, electrical equipment, machinery, equipment or machinery with protruding parts, or other similar units, because of their function or form, may harm an employee who falls into or onto the equipment.
- **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, measured between the location of the user's fall-arrest attachment point (dorsal D ring) at the onset of fall-arrest forces during a fall (and after the fall-arrest attachment point comes to a complete stop), is the additional vertical distance a falling employee travels (excluding dynamic elongation and free-fall distance) before stopping, from the point at which the deceleration device begins to operate or deploy.
- **Descent Controller.** A device designed to be used by one worker for personal descent to lower another person from an elevation. Descent control may be used for egress, positioning or both.
- **Designated Area.** A distinct portion of a walking-working surface, delineated by a perimeter warning line, in which employees may perform work without additional Fall Protection. **The designated area is used only for general industry work.**
- **D-ring.** An integral "D" shaped connector typically used in harnesses, lanyards, energy absorbers, lifelines, and anchorage connectors as an attachment point.
- **Dorsal.** A location on a full body harness that falls approximately between the user's shoulder blades.
- **End-user (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.
- **Energy (Shock) Absorber.** A component whose primary function is to dissipate energy and limit deceleration forces that the system imposes on the body and the anchorage system during fall-arrest.
- **Energy Absorber, Horizontal Lifeline.** An energy absorber that is attached to one of the end anchorages or anchorage connectors of a horizontal lifeline subsystem.
- **Energy Absorber, Personal.** An energy absorber that is attached to a harness.
- **Energy Absorber, Single Anchor Vertical Lifeline.** An energy absorber that is attached to the top anchorage or anchorage connector of a single anchor vertical lifeline subsystem.
- **Engineered Anchor.** An anchorage designed and approved by a Qualified Person.
- **Equipment.** A general term referring to components, subsystems or systems, in any combination, singular or plural.
- **Evacuation Harness.** A component for rescue purposes consisting of elements designed and constructed so that the rescue subject is securely held during the rescue process. Evacuation harness is a special harness.
- **Failure.** Load refusal, breakage, or separation of component parts. Load refusal is the point at which the ultimate strength is exceeded.
- **Fall Arrest.** The action or event of stopping a free fall or the instant the downward free-fall has been stopped.

- **Fall-Arrest System.** A combination of equipment and components such as full-body harnesses, lanyards, deceleration devices, anchorages, horizontal or vertical lifelines connected together, designed to stop a person from striking a lower level or an obstruction during a fall.
- **Fall arrester.** A device that travels on a lifeline and will automatically engage or lock onto the lifeline in the event of a fall. A rope grab is one example of fall arrester. .
- **Fall Hazard.** Any location where a person is exposed to a potential free fall. This could be unprotected side or edge of a walking/working surface or unprotected opening from which a person will fall to lower surface.
- **Fall Hazard Survey Report.** A written document that contains information about existing or potential fall hazards and a method or methods for eliminating, preventing or controlling those hazards.
- **Fall Prevention.** The elimination and minimization of potential Fall-Hazards, lessening the chance of employee exposure to falls. Any same-level means used reasonably to prevent exposure to a Fall-Hazard; examples of fall prevention are guardrails, walls, floors, and area isolation. Also called passive Fall Protection system.
- **Fall Protection.** Action and procedures to protect a worker effectively from Fall-Hazards. Any equipment, device or system that prevents an accidental fall from elevation or that mitigates the effect of such a fall.
- **Fall Protection Program Manager.** A person assigned by the command to be responsible for developing and managing the Fall Protection program at a Navy Command.
- **Fall Protection System.** A system that prevents workers from falling or, if a fall occurs, arrests the fall. Examples include guardrails, restraint, safety net and fall arrest systems.
- **Fall Restraint.** See “Restraint System”.
- **Flexible Carrier.** A carrier constructed of stranded wire rope or other flexible line materials. Flexible carriers are typically mounted to the climbing ladder or structure only at the top and bottom of the system and are generally installed under some amount of tension.
- **Force Factor.** The ratio of peak arresting force of a rigid mass to a human body having the same weight, both falling under identical conditions.
- **Forced Rollout.** An action by which the gate of a locking snap-hook or carabiner is loaded beyond its design strength, forcing it to fail and disengage from the component to which it was attached.
- **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, which 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.)
- **Frontal.** A location on the front of a full body harness that falls below the End User’s chest area.
- **Frontal D-Ring Attachment.** An attachment element affixed to the full body harness within the vertical seven-inch sternum (breastbone) area that is designed to withstand dynamic fall arrest, restraint, and post-fall suspension forces.
- **Full-body harness.** See the definition of “Body Harness”.
- **Full Body Harness Stretch.** The difference between the lowest point on the torso post-fall and the lowest point on the torso pre-fall in relation to the attachment element. This accounts for a component of the system stretch out and total fall distance.
- **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 toeboard.

- **Hardware.** A rigid component or element that is used to couple parts of the system together.
- **Hazard Elimination.** Changing the task, process, controls or other means so as to remove the need for the End User to be exposed to a fall hazard.
- **Hole.** Means a gap or open space in a floor, roof, horizontal walking-working surface, or similar surface that is at least 2 inches in its least dimension.
- **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.
- **Horizontal Lifeline Subsystem.** An assembly, including the necessary connectors, comprised of a horizontal lifeline component and, optionally, of: a) An energy absorber component or, b), a lifeline tensioner component, or both. This subsystem is normally attached at each end to an anchorage or anchorage connector and may contain one or more intermediate anchorages. The end anchorages have the same elevation.
- **Horizontal Track System.** A form of rigid rail system that typically encloses a trolley inside a formed channel or track.
- **Hybrid Component.** An integral assembly of elements or components, or both, intended to perform more than one function in the system.
- **Infrequent.** Means that the task or job is performed only on occasion, when needed (e.g., equipment breakdown), on an occasional basis, or at sporadic or irregular intervals. Infrequent tasks include work activities such as annual maintenance or servicing of equipment, monthly or quarterly replacement of batteries or HVAC filters, and responding to equipment outage or breakdown. In these instances, the frequency of exposure to fall hazards is very limited. By contrast, tasks performed or repeated on a daily, routine or regular basis are not infrequent activities within the meaning of the final rule (2016). Infrequent jobs also do not include those that workers perform as a primary or routine part of their job or repeatedly at various locations during a work-shift. A task may be considered infrequent when it is performed once a month, once a year, or when needed. The “INFREQUENT” exception is not applicable for Shipboard/Afloat processes or operations.
- **Ladder Climbing (Safety) Device.** See Climbing Ladder Fall Arrest System.
- **Initial Sag.** The initial mid-span deflection on a horizontal lifeline due to static equilibrium between gravitational forces and pre-tension.
- **Integral.** Not removable from the component, subsystem or system without destroying or mutilating any element or without use of a special tool.
- **Lanyard.** A component consisting of a flexible line of rope, wire rope, or strap that usually has a connector at each end for connecting the body support and to a fall arrester, energy absorber, anchorage connector, or anchorage.
- **Lanyard Parking Attachment Element.** A loop device to facilitate the temporary storage of an unused leg of the lanyard.
- **Leading Edge.** The unprotected side and edge that exposes a worker to a Fall-Hazard. It can be the edge of a floor, roof, or formwork for a floor or other walking/working surface where the edge changes location as additional floor, roof, decking or formwork sections that are placed, formed or constructed.
- **Lifeline.** A component consisting of a flexible line which is connected either to an anchorage at one end, and hangs either vertically (single anchor vertical Lifeline), or is connected to anchorage at both ends and stretches horizontally (Horizontal Lifeline); both of which serve as means for connecting other components of a personal fall-arrest system.
- **Lifeline Tensioner.** A device, such as a turnbuckle, to tighten a horizontal lifeline or a weight to tension a vertical lifeline.

- **Load bearing Straps.** Full body harness straps which support the load during a fall or under normal use.
- **Man Overboard Plan.** A man overboard plan is an emergency plan for rescuing personnel if they accidentally fall into the water.
- **Manual Descent Controlled Device.** A load-lowering device or mechanism that, once engaged, requires manual attention to control payout speed of line, or descent speed under load.
- **Marking.** Any sign, label, stencil, plate or the like containing information or guidance.
- **Maximum Arrest Force (MAF).** The peak force exerted on the body when a Fall Protection system arrests or stops a fall.
- **Maximum Arrest Load (MAL).** The peak force applied to an anchorage by an active Fall Protection system when arresting a fall.
- **May.** The word should is to be understood as denoting a recommendation.
- **Must.** The word shall is to be understood as denoting a mandatory requirement.
- **Non-Certified Fall Protection Anchorages.** An unquestionably strong anchorage that a Competent Person determines to be capable of supporting the predetermined anchorage strength as prescribed by OSHA Standards and ANSI/ASSP Z359 Fall Protection Code. Non-Certified anchorages are used for fall-arrest, work positioning, travel restraint, or rescue.
- **Opening.** Means a gap or open space in a wall, partition, vertical walking-working surface, or similar surface that is at least 30 inches high and at least 18 inches wide, through which an employee can fall to lower level.
- **Orthostatic Intolerance (suspension Trauma).** The development of symptoms as a result of suspension in a full-body harness, such as light-headedness, palpitations, tremulousness, poor concentration, fatigue, nausea, dizziness, headache, sweating, weakness, and occasionally fainting and unconsciousness.
- **Passive Fall Protection System.** A system that does not require a worker to use or wear personal Fall Protection equipment. Examples include safety nets, guardrails, parapet walls, etc.
- **Personal Energy Absorber.** See “Energy Absorber”.
- **Personal fall-arrest System.** Assembly of components and subsystems used to arrest an end-user 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.**
- **Personal Fall Protection System.** A system (including all components) used to provide protection from falling or to safely arrest an employee's fall if one occurs. Examples of personal Fall Protection systems include fall arrest systems, positioning systems, and travel restraint systems.
- **Personnel.** All military and DON civilians.
- **Platform.** A walking working surface that is elevated above the surrounding area.
- **Positioning Lanyard.** A lanyard used to transfer forces from a body support to an anchorage or anchorage connector in a positioning system.
- **Positioning Line.** A vertical, horizontal or angled rope or wire rope used to transfer forces from a body support to an anchorage or anchorage connector in a positioning system.
- **Positioning System.** A combination of equipment including a full-body harness rigged to allow the end-user to work with both hands free while being supported on an elevated vertical or inclined work surfaces. Positioning lanyard may be fixed length or adjustable and is part of positioning system.
- **Pre-Incident Plan.** A formal written plan, prepared jointly by the host DON command/activity and the fire emergency responders, containing factors that need to be evaluated when assessing the potential situations that could affect a facility during emergency conditions.

- **Primary System.** In Fall Protection terminology, the main mechanism that allows a worker to maintain his or her desired position.
- **Qualified Person (QP) for Fall Protection.** 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.
- **Rescue.** The process of evacuating a person or persons from danger, harm or confinement to a safe location where they also may receive medical attention.
- **Rescue Ladder.** A flexible ladder with rigid rungs and either synthetic webbing or wire rope side rails which can be temporally hung next to the end-user working at heights, or can be lowered to an end-user suspended in a harness, to allow him to climb back up to the working surface (or at least stand on the ladder while awaiting rescue, allowing the necessary circulation of the blood to the entire body while an assisted rescue is being commenced).
- **Rescue Lanyard.** A component consisting of flexible line of rope or strap, which usually has a connector at each end for connecting the body support to components of a rescue system. A rescue lanyard is a special lanyard.
- **Rescue Plan (Fall-arrest).** A written plan that describes the rescue method and procedures to be used to rescue an end-user of Fall Protection, who may have fallen from a height and be suspended in a full-body harness. The suspended worker may have been injured or incapacitated prior to, or as the result of, the fall (See section 10.13 for a sample fall-arrest rescue plan).
- **Restraint System.** A combination of devices designed to restrain an end-user 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 strap can be single or multiple.
- **Rigid Anchorage Subsystem.** An anchorage system, such as a rigid rail, trolley system, or a single point of attachment, which does not appreciably deflect, deform, or stretch when a fall-arrest impact occurs.
- **Rigid Carrier.** A carrier constructed of a single piece or multiple joined pieces of solid material that forms a rigid member. Carrier stops may or may not be subject to fall arrest loading depending on location. Some system carrier mounting brackets may function as a carrier stop.
- **Rigid Rail System.** A Fall Protection system that uses one or more trolleys on a horizontal track (often an I-beam or slotted tube).
- **Rigging.** The process of building a system to move or stabilize a load or the system itself.
- **Rollout.** A process by which a snap-hook or carabiner unintentionally disengages from another connector or object to which it is attached.
- **Rope Access.** A technique consisting of two lifelines independently anchored at the top to protect the End User (authorized person) from falling. The ropes directly suspend the person. The technique is used on buildings, bridges, and other structures for conducting inspection, cleaning, and painting.
- **Rope (or Strap) Adjuster.** A mechanical means of readily moving a vertical line attachment or changing the position of an intermediate anchorage device between an anchorage (connector) and a body support while loaded with the authorized person's weight or partial weight while leaning.
- **Rope Grab.** See Fall-arrester.
- **Rope, Synthetic.** A construction of bundled manmade yarns, fibers, or filaments forming a strong flexible line.
- **Rope, Wire.** A plurality of drawn wires forming strands laid helically over an axis or core.
- **Runway.**

- 1. A passageway for a person elevated above the surrounding floor or ground level, such as a foot-walk along shafting or a walkway between buildings.
- 2. Elevated crane rails upon which an overhead electric crane travels.

- **Safety Margin.** A clearance factor of safety defined as the distance between the lowest extremity of the worker's body at fall arrest and the highest obstruction the worker might otherwise make contact with during a fall.
- **Safety Net System.** A horizontal or semi horizontal cantilever-style barrier that uses netting system to stop falling workers before they make contact with a lower level or obstruction.
- **Safety Strap/Relief Step Strap.** See Suspension Trauma Strap
- **Sag.** The distance the wire rope or synthetic cable of a horizontal lifeline deviates from the horizontal plane established by the end anchorage. This is defined by the line between two anchorages, measured downward at the mid-point of the wire rope or cable.
- **Secondary Fall Protection System.** One or more means of Fall Protection, as defined by these standards, configured as a supplement or as backup to protect a worker from a potential fall if the primary system fails.
- **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 pays 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 (SRL's), self-retracting lanyards with integral rescue capability (SRL-R's), and self-retracting lanyards with leading edge capability (SRL-LE's) 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 ft. or less.
- **Self-Retracting Lanyard with Integral Rescue Capability.** A SRL that includes integral means for assisted-rescue via raising or lowering the rescue subject.
- **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.
- **Seat Sling.** A seat sling designed for attachment to a full-body harness, designed so that a worker may sit for a short period of time without pooling of blood in the legs.
- **Self/Manual Deploying Rescue Ladder.** A coiled webbing rescue ladder (in a pouch) connected to the lanyard or anchorage which either self-deploys during a fall, or is manually released by the end-user after a fall, and is left dangling next to the suspended end-user. This allows the end-user to climb back up to the anchorage (or at least simply stand in the ladder, allowing the necessary circulation of blood to the entire body while an assisted rescue is being commenced).
- **Shock Absorber.** See Energy Absorber
- **Single Anchor lifeline (LL).** A flexible line along which a fall arrestor travels that is supported by a single anchorage. Single anchor lifeline can be used in vertical, horizontal or sloped applications.
- **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 close to retain the object. Only self-locking (single- or double-locking) snaphooks are acceptable for use.
- **Soft Loop Attachment Element.** A non-metallic attachment element of a FBH constructed of synthetic fiber webbing.

- **Stable Surface.** A walking working surface that has the strength and structural integrity to support the End User(s).
- **Sternal.** A location on a FBH that falls approximately between the user's chest area.
- **Strap.** A length of webbing that may be incorporated in a harness, lanyard or other component or subsystem.
- **Strap, Chest.** A harness strap passing generally horizontally across the chest or around the body at chest level with adjustable means for fastening.
- **Strap, Shoulder.** A harness strap that passes from the waist, up the chest, over the shoulder and down the back to the waist. It is connected to the waist strap or thigh straps or sub-pelvic strap or combinations thereof.
- **Strap, Sub-Pelvic.** A full body harness strap, which passes under the buttocks without passing through the crotch and is designed to transmit, to the sub-pelvic part of the body, forces applied during fall arrest and post-fall suspension.
- **Stretch Out.** The change in distance between the End Users D-ring and toes during a fall arrest.
- **Suspension.** The act of supporting 100% of the End User's body weight, including equipment for the purpose of accessing a work location with one or two points of contact.
- **Suspension Seat.** An arrangement of straps in a harness used to provide a body support and permit leaning or sitting while working.
- **Suspension Trauma (Harness-induced Pathology).** Where the body is at rest in a vertical state with the lower body motionless, and blood begins to pool in the lower extremities because the muscles in the legs are not contracting on the veins and helping the blood back to the heart (against gravity). Blood is not properly circulated, the individual's blood pressure drops, the brain does not receive adequate blood flow and unconsciousness follows.
- **Suspension Trauma Safety Steps/Relief Step Strap.** A coiled strap (in a pouch) attached to the harness which is manually deployed after a fall to help prevent the effects of suspension trauma by allowing the end-user to insert one foot (or two feet, depending on the style) into the loop step and stand up allowing the necessary circulation of blood to the entire body, while an assisted rescue is being commenced.
- **Suspension Work seat.** A seat board with integral body belt, suspension D-rings, and adjustable leg and shoulder straps designed so that a worker may sit for long period of time without pooling of blood in the legs.
- **Swing fall.** A pendulum-like motion that can result from moving horizontally away from, or toward, a fixed anchorage, and falling. Swing falls generate the same amount of force when falling the same distance vertically. Swing fall has the hazards in both the horizontal direction (swinging into obstruction) and vertical direction (falling onto obstructions or ground).
- **Swing Fall Distance.** The vertical drop in height experienced by the worker using a fall arrest system from the onset of the swinging motion to the lowest point reached during a swing.
- **Synthetic Rope Tackle Block.** A load lifting and/or lowering device that does not include a winding or traction drum but uses pulleys to achieve a mechanical lifting advantage (often used in a rope rescue system).
- **Temporary.** Means that the duration of the task the worker performs is brief or short. Temporary and brief or short tasks generally include those that a worker is able to perform in less time than it takes to install or set up conventional Fall Protection. Temporary tasks generally are limited to "simple" tasks and "short-term, scheduled maintenance or minor repair activities" temporary and simple tasks are those that do not require "significant equipment, personnel, and other resources" or a level of exposure that "long-term" or "complicated" maintenance and repair work does. Short duration tasks generally are those that take less than "1 - 2 hours" to complete.

- **Testing, Qualification.** The controlled application of test conditions to a product specimen randomly selected from the initial production lot, and the recording of observed effects, for the purpose of determining the product's compliance with the requirements of these standards. When the terms “testing” or “tests” are used in the Z359 standards, those terms shall denote qualification testing or qualification test(s), not developmental or verification testing or test(s) unless otherwise specified.
- **Testing, Verification.** The controlled application of test conditions to a product specimen sampled from ongoing production lots (after qualification testing), and the recording of observed effects, for the purpose of confirming the product's continuing compliance with the requirements of these standards. Proof load testing is a type of verification testing.
- **Thimble.** A grooved metal or plastic piece about which a rope is bent and spliced or swaged to the main body of the rope to form an eye.
- **Toeboard.** A low protective barrier to prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.
- **Total Fall Distance.** The total vertical distance fallen by the worker using a fall-arrest system between the onset of a fall and the instant when the worker first achieves zero vertical velocity; or the vertical distance fallen by an end-user connected by a fall-arrest system to an anchorage measured from the walking/working surface and extending downward to a position after the fall is arrested. The total fall distance includes the sum of the free-fall, elongation, and deceleration distances of the system.
- **Travel Restraint.** See restraint system.
- **Travel Restraint Lanyard.** A lanyard used to transfer forces from a body support to an anchorage or anchorage connector in a travel restraint system. Travel restraint lanyard may be fixed length or adjustable and is part of the restraint system.
- **Travel Restraint Line.** A rope or wire rope used to transfer forces from the body support to an anchorage or anchorage connector in a travel restraint system.
- **Trolley.** A mobile anchorage device that travels along a track (horizontal track system), structural beam (rigid rail system), or cable (HLL system).
- **Waist.** A location on a full body harness corresponding to the area on the body falls typically between the thorax and hips.
- **Warning Line System.** A barrier erected on 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 guardrail, 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.
- **Walking/Working Surface.** Any surface, whether horizontal or vertical, on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, form work, and concrete reinforcing steel (but not including ladders, vehicles, or trailers), on which employees must be located in order to perform their job duties.
- **Webbing.** A narrow woven fabric with selvedge edges and continuous filament yarns made from light and heat resistant fibers.
- **Winch/hoist.** A load lifting and/or lowering device that incorporates a winding drum and means for controlling payout and take-up of the line from the drum.
- **Wire.** A single, continuous length of metal with a circular cross-section that is cold-drawn from rod.
- **Work Positioning:** See “Positioning’’
- **Working Line:** A flexible line used for positioning and travel restraint.
- **Working Load.** The un-factored static component of the design load as stated by the manufacturer. Note: refers to aggregate simultaneous load of personnel, equipment, and/or material to be supported by the equipment or system.

CONSOLIDATED APPENDICES LISTING (HYPERLINKED)

Appendix A American National Standards Institute, ANSI Z359 Fall Protection Code/Standards

ANSI is responsible for the development of voluntary consensus standards in the United States. The collection of several ANSI Z359 Fall Protection standards is termed "Fall Protection Code". Originally The American National Standards Institute, ANSI Z359 Committee developed ANSI Z359.1 titled personal fall-arrest system standard. All the testing and criteria was based on complete fall-arrest systems rather than components. In order to harmonize the US FP standards with ISO, Europe, Canada, etc., ANSI changed the system standards to equipment/component standards. Every component has its own standard (i.e. Harnesses, Connectors, etc.) ANSI Z359.1 standard was updated and became a directory for all the component standards. Eventually there will be 19 Fall Protection standards as part of the FP Code.

Completed and Published ANSI Z359 FP Standards

a. ASSP Z359.0 (2023) Definitions and Nomenclature Used for Fall Protection and Fall-arrest.
b. ANSI Z359.01 (2020) The Fall Protection Code
c. ANSI Z359.2 (2017) Minimum Requirements for a Comprehensive Managed Fall Protection Program
d. ANSI Z359.03 (2019) Safety Requirements for Positioning and Travel Restraint Lanyards
e. ANSI Z359.04 (2013) Safety Requirements for Assisted- Rescue and Self Rescue Systems, Subsystems and Components
f. ANSI Z359.06 (2017) Specifications and Design Requirements for Active Fall Protection Systems
g. ANSI Z359.07 (2019) Certification Testing of Fall Protection Products
h. ANSI Z359.09 (2021) Personal Equipment for protection against falls-Descent Controllers
i. ANSI Z359.11 (2021) Safety Requirements for Full Body Harnesses
j. ANSI Z359.12 (2019) Connecting Components for Personal Fall-arrest Systems
k. ANSI Z359.13 (2013) Personal Energy Absorbers and Energy Absorbing Lanyards;
l. ANSI Z359.14 (2021) Requirements for Self-Retracting Devices
m. ANSI Z359.15 (2014) Requirements for Single Anchor Lifelines and fall-arresters
n. ANSI Z359.16 (2016) Safety requirements for Climbing Ladder Fall-Arrest Systems
o. ANSI Z359.18 (2017) Requirements for Anchorage Connectors for PFAS
p. ANSI Z459.1 (2021) Safety Requirements for rope access systems

ANSI Z359 Fall Protection Standards under Development

- ANSI Z359.05 Not Selected
- ANSI Z359.08 Not selected
- ANSI Z359.10 Not selected
- ANSI Z359.17 Safety Requirements for Horizontal Lifelines for PFAS
- ANSI Z359.19 Rigid Rail Anchorage Subsystems for Personal Fall arrest System

Note:

The Requirements for Suspended Rope Access Standard was taken out of the Z359 FP Code/Standards and given a new stand-alone number, Z459.1 Standard. The standard is still part of the FP Code

The equipment/product requirements prescribed in the completed and published Z359 standards above supersede all the requirements prescribed in ANSI Z359.1 (2007) standard,

End of Section

APPENDIX B-Fall Protection Requirements Comparison Among Various OSHA Standards, DON and EM-385, Section 21 Requirements

Note: The 29 CFR 1910 Standards, Subpart D (1970) requirements for Walking Working surfaces were replaced with the 29 CFR 1910 (11/2016) requirements. The requirements for 29 CFR 1910.140 for Personal Fall Protection Systems was included in Subpart I of 29 CFR 1910.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
Threshold Height **FP is required**	• Above **4 feet**	• Above **4 feet**	• Contractors - Above **6 feet** • USACE-Personnel – Above **4 feet**	• Above **6 feet**
Development of Fall Protection Program	• Each Activity which has personnel exposed to fall hazards shall establish a managed Fall Protection program. • DON Activities shall conduct fall hazard surveys and prepare survey reports. • Navy Activities shall prepare a site-specific Fall Protection &	• Not addressed	• Every Contractor and USACE – (Owned/Operated permanent facility is responsible for establishing, implementing and managing a Fall Protection program • Contractors having personnel working at heights, exposed to fall hazards and using FP	• Not addressed

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
	Prevention Plan (FP&PP). • The FP & PP shall be developed either by a QP or CP.		equipment shall develop a site-specific Fall Protection and Prevention Plan (FP&PP) and submit it to GDA for review and acceptance as part of APP. • The FP&PP shall be developed by either CP or QP. • USACE-Owned/Operated Permanent Facilities having personnel working at heights are required to develop a written FP program and a site-specific FP&PP. • Each USACE-Owned/Operated Permanent facility shall conduct a Fall Hazard Survey and prepare survey	

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
			Report at existing buildings or structures.	
Preferred Order of Control Measures or Hierarchy of Controls for Fall hazards	• Elimination • Prevention • Engineering Controls (design change or using different techniques or equipment (i.e. Work Platforms)) • Administrative Controls • Personal Protective Systems and Equipment.	• Not addressed	• Elimination • Prevention • Work Platforms • Personal Protective Systems and Equipment • Administrative Controls	• Not addressed
Guardrails **Constructed from wood, structural steel, pipe or steel cable**	• Consists of top rail, midrail, posts, and toeboard (toeboard as applicable). • Top rail shall be 42 +/- 3 inches high and withstands a force of 200 lbs. • Midrails half way between top-rail and walking/working level and shall withstand a force of 150 lbs. • Supporting posts shall be installed at	• Consists of top-rail, mid-rails, posts, and toe-boards • Top edge of railing shall be 42 + 3/- inches high and withstands a force of 200 lbs. • Mid rails installed half way between top railing and walking/working level and shall withstand a force of 150 lbs.	• Consists of top-rail, midrail, posts, and toeboard. • Top rail shall have a vertical height of 42 +/- 3 inches and withstands a force of 200 lbs. • Mid rails shall be installed half way between top rail and staging, working platform, or runway and	• Consists of top-rail and midrail, posts, and toeboard • Top edge of railing shall be 42 +/- 3 inches high and withstands a force of 200 lbs. • Mid rails half way between top railing and walking/working level.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
	whatever distance is necessary to meet the top rail strength requirement of 200 lbs. without failure • Toe-boards shall be 3 ½ inches high and shall withstand a force of 50 lbs. • For existing Parapet walls with height, less than 42 inches will require modification to make the height 42 inches +/- 3 inches.	• Supporting posts shall be installed at whatever distance is necessary to meet the top rail strength requirement of 200 lbs. without failure. • Toe-boards shall be 3 ½ inches high and shall withstand a force of 50 lbs. • For existing Parapet walls with height, less than 42 inches will require modification to make the height 42 inches +/- 3 inches.	shall withstand a force of 150 lbs. • Supporting posts shall be installed at whatever distance is necessary to meet the top rail strength requirement of 200 lbs. without failure. • Toe-boards shall be 3 ½ inches high and shall withstand a force of 50 lbs. • In order for the height of parapet walls to be in compliance, it shall be 42 +/- 3 inches high. • Commercial off the shelf engineered guardrail systems may be used instead of constructing a system with the materials	• Posts spaced no more than 8 feet apart. • Toe-boards shall be 3 ½ inches high and shall withstand a force of 50 lbs.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
			prescribed in section 21 and shall be designed to meet the guardrail criteria.	
Work Platforms	• When working ≥ **4 feet** above the ground, the platform must be equipped with a standard guardrail or other Fall Protection systems. • All Types of Suspended scaffolds require railing and single anchor vertical lifeline system. • Scissor lifts shall be equipped with standard guardrails. In addition, scissor lift shall be equipped with anchorages meeting ANSI Z359, Fall Protection Code/Standards. • A restraint system shall be used to prohibit workers from climbing out of, or	• Railing is required when working ≥ **4 feet** above the ground level. • All work platforms and Scissor lifts shall comply with 1926 Subpart L	• FP is required above **6 feet for contractors.** • For USACE Operated Facilities, FP is required above 4 ft. • Scaffolds shall be equipped w/guardrail or other FP system. • For workers erecting and dismantling scaffolds, if it is not feasible to provide FP, an evaluation shall be conducted by the competent person for Fall Protection detailing rationale why FP is not feasible and shall be submitted to GDA for review	• When working **> 6 feet** above solid surface, platforms must be equipped with a standard guardrail or other Fall Protection system. • Suspended scaffolds require railing and vertical lifeline. • Scissor lifts-require railing.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
	being ejected from, the platform. • It is highly recommended to use adjustable energy absorbing lanyards • All suspended scaffolds require railing and single anchor vertical lifeline system.		and acceptance as part of AHA. • All suspended scaffolds require railing and single anchor lifeline. • Self-Propelled Elevating Work Platforms (Scissor lifts) shall be equipped with standard guardrails. In addition, anchorages meeting Z359. A restraint system with a lanyard sufficiently short shall be used. Lanyards with built in EA are acceptable. The use of a self-retracting device (SRD) is prohibited unless permitted by the scissor lift and SRD manufacturers and used in	

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
			accordance with their instructions.	
Covers	• Install covers on any hole 2 inches or more in its least dimension in walking working surfaces. • Shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at one time. • A guardrail, travel restraint, or fall arrest system must be used to protect personnel from tripping into or stepping into or through holes, when covers are removed.	• Install covers on any hole, 2 inches or more in its least dimension. • Covers shall be capable of supporting without failure at least twice the maximum intended load of employees, equipment and material combined. • Provide hinged floor hole cover of standard strength and construction equipped with guardrail or permanently attached. • A guardrail, travel restraint, or fall arrest system must be used to protect personnel from tripping into or stepping into or	• Install covers on any hole, 2 inches or more in its least dimension. • Covers shall be capable of supporting without failure, at least twice the weight of worker, equipment and material combined. • Shall be secured and color-coded when installed.	• Install covers on any hole, 2 inches or more in its least dimension in walking working surfaces. • Shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at one time. • No stipulation for removal.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
		through holes, when covers are removed.		
Safety Net Systems	• Shall be installed as close as possible under the walking working surface with unprotected side or edge but not lower than 25 feet. • Maximum size of mesh opening shall not exceed 36 square inches and no longer than 6 inches on any side. • Minimum breaking strength of outer rope or webbing shall be 5,000 lbs. • Shall be tested immediately after installation with a 400 lbs. sand bag dropped from the same elevation a worker might fall. • Specifies limits for safety net extension below the unprotected side or edge.	• The final rule refers to the requirements of Subpart M.	• Shall be installed as close as practicable under the walking, working surfaces, but not lower than 30 feet. • Maximum size of mesh opening shall not exceed 36 square inches and no longer than 6 inches on any side. • Minimum breaking strength of outer rope or webbing shall be 5,000 lbs. • Shall be tested immediately after installation with a 400 lbs. sand bag dropped from a height at least 42 inches above the	• Shall be installed as close as practicable under the walking, working surfaces, but not lower than 30 feet. • Minimum braking strength of outer rope or webbing shall be 5,000 lbs. • Maximum size of mesh opening shall not exceed 36 square inches and no longer than 6 inches on any side. • Shall be tested immediately after installation with a 400 lbs. sand bag dropped from a height at least

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
			walking and working surfaces. • If a QP can demonstrate in writing that it is unreasonable to perform the drop-test, the QP shall certify in writing that the net and installation (to include anchorages) is in compliance with all requirements and submitted for review and acceptance by the GDA. • Inspection: immediately after installation, weekly thereafter and following any repair or alteration. Inspection shall be documented. • Specifies limits for safety net extension below the	42 inches above the walking, working surfaces. • Include specific limits for safety net extensions below the unprotected side or edge.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
			unprotected side or edge.	
Personal Fall Arrest System (PFAS) Requirements	• Maximum free fall distance of 6 feet. • Maximum arresting force of 1,800 lbs. • Shall stop the fall with a deceleration distance of less than 42 inches. • Prevent a person from contacting lower level or object. • Body belts are not authorized.	• For walking/working surfaces, PFAS requirements are addressed in OSHA 29 CFR 1910.140. • Maximum free fall distance of 6 feet. • Maximum arresting force of 1,800 lbs. • Shall stop the fall with a deceleration distance of less than 42 inches. • Prevent a person from contacting lower level or object. • Body belts are prohibited.	• Maximum free fall distance of 6 feet. • Maximum arresting force of 1,800 lbs. • Shall stop the fall with a deceleration distance of less than 42 inches. • Prevent a person from contacting lower level or object. • Body belts are not authorized.	• Maximum free fall distance of 6 feet. • Maximum arresting force of 1,800 lbs. • Shall stop the fall with a deceleration distance of less than 42 inches. • Prevent a person from contacting lower level or object. • Body belts are not permitted.
Fall Protection Equipment Selection Criteria	• DON activities shall only use equipment that meets ANSI Z359. FP Code/ Standards.	• Employers should obtain comprehensive instructions from the suppliers.	• Selection of equipment shall be based on type of work; work environment, weight, size and shape of the	• The type of fall arrest system selected should match the particular work situation and any free fall distance

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
	• Any equipment not meeting at least ANSI/ASSE Z359.1-2007 is not authorized for use and shall be taken out of service. • Only the Qualified Person for Fall Protection can make the determination of increasing the free fall distance more than **6 feet.** • Frontal D-ring attachment point located at the sternum can be used for fall arrest provided the free fall distance is less than 2 feet and maximum arrest force does not exceed 900 lbs.		worker, type and position/location of anchorage and length of lanyard. • Use only equipment meeting ANSI Z359.FP Code/Standards. Any equipment meeting ANSI A10.14 or Z359.1 (1992, R1999) shall not be used. • Frontal and sternal D-ring attachment points located at the waist and sternum can be used for fall arrest provided the free fall distance is less than 2 feet and maximum arrest force does not exceed 900 lbs. • Only the qualified person for Fall Protection can make the determination of	should be kept to a minimum. • Consideration should be given to a particular work environment.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
			increasing the free fall distance more than **6 feet.**	
Definition of Qualified Person	• **Qualified Person for Fall Protection**: A person with a recognized engineering degree or professional certificate and with extensive knowledge, training, and experience in Fall Protection and rescue field, who is capable of performing design, analysis, and evaluation of Fall Protection rescue systems and equipment.	• **Qualified**: Describes a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project.	• **Qualified Person for Fall Protection:** 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.	• **Qualified**: means one who, by possession of a recognized degree, 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.
Definition of Competent Person	• **Competent Person for Fall Protection:** A person designated by the Command to be responsible for the immediate	• **Competent Person:** Means a person who is capable of identifying existing and predictable hazards in any	• **Competent Person for Fall Protection (See Appendix Q):** A person designated in writing in the AHA	• **Competent Person:** Means one who is capable of identifying existing and predictable

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
	supervision, 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 system or any component thereof, AND who has the authority to take prompt corrective measures to eliminate or control the hazards of falling.	personal Fall Protection system or any component of it, as well as in their application and use with related equipment, and who has authorization to take prompt, corrective action to eliminate the identified hazards.	by the employer to be responsible for the immediate supervision, implementation and monitoring of the Fall Protection program, who through training, knowledge and experience in Fall Protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.	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.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
Fall Arrest Anchorages	• Capable of supporting a minimum of 5,000 lbs. attached; or shall be designed, installed and used under the supervision of a qualified person and shall maintain a safety factor of at least two. • All HLL anchorages shall be designed by a registered PE qualified in designing HLL system	• In the Final Rule, references the anchorage strength for personal FP system as 5,000 lbs. which includes fall arrest anchorages	• Capable of supporting at least 5,000 lbs. per worker attached or designed by a qualified person for Fall Protection for twice the maximum arrest force on the body. • All HLL anchorages shall be designed by a registered PE qualified in designing HLL systems	• Anchorages shall be capable of supporting at least 5,000 lbs. per employee attached, or shall be designed, installed and used as part of a complete fall arrest system which maintains a safety factor of least 2 and under the supervision of qualified person.
Snaphooks and Carabiners	• The Gates of Snaphooks and carabiners shall withstand a force of 3,600 pounds in all directions • Snaphooks and Carabiners manufactured per ANSI Z359.1 (1992-R1999) shall not be used	• The Final Rule prescribes the gates of snaphooks and carabiners shall withstand 3,600 lbs. all around.	• The Gates of Snaphooks and carabiners shall withstand a force of 3,600 pounds in all directions • Snaphooks and Carabiners manufactured per ANSI Z359.1 (1992-R1999) shall not be used.	• The gates of snaphooks and carabiners shall withstand a side loading of 220 pounds and face loading of 220 pounds

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
Energy Absorbing Single and Y Lanyards and Self Retracting Devices	• The 6 ft. FF Energy Absorbing (EA) Lanyards shall be used when the tie-off point is above the dorsal D ring. The average arrest force on the body shall not exceed 900 lbs. • The 12 ft. FF EA Lanyard shall be used when the tie-off point is below the dorsal D ring creating a FF distance of more than 6 feet. The average arrest force on the body shall not exceed 1,350 lbs. • The 12 ft. FF EA lanyard may also be used when the free fall distance is less than 6 ft. • The length of all EA lanyards used in FA shall not exceed 6 feet. • The 6 ft. and 12 ft. EA Lanyards shall meet the	• SRLs and lifelines that automatically limit free fall distance to 2 feet or less must have components capable of sustaining a min tensile load of 3,000 pounds. • SRLs that do not limit the FF to 2 feet or less must be capable of sustaining a min tensile load of 5,000 pounds,	• The 6 ft. FF Energy Absorbing (EA) Lanyards shall be used when the tie-off point is above the dorsal D ring. The average arrest force on the body shall not exceed 900 lbs. • The 12 ft. FF EA Lanyard shall be used when the tie-off point is below the dorsal D ring creating a FF distance of more than 6 feet. The average arrest force on the body shall not exceed 1,350 lbs. • The 12 ft. FF EA lanyard may also be used when the free fall distance is less than 6 ft. • The length of all EA lanyards used in FA shall not exceed 6 feet.	• SRLs that automatically limit free fall distance to 2 feet or less, must withstand a min tensile load of 3,000 pounds • No reference to SRLs that do not limit the FF to less than 12 inches

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
	requirements of ANSI Z359.13 Standard. • The Requirements of SRDs shall meet Z359.14 standard.		• The 6 ft. and 12 ft. EA Lanyards shall meet the requirements of ANSI Z359.13 Standard.	
Training	• Workers exposed to fall hazards from heights and using FP equipment shall be trained by a Competent Person for Fall Protection who is qualified in delivering FP training. • Retraining shall also be provided as necessary. • Refresher training will be provided at an interval determined by the activity. • Training of all personnel involved in the FP program including associated trainers shall be in accordance w/ANSI Z359.2.	• 29CFR 1910, Subpart D States that employer must provide training to each employee who uses personal FP equipment. • Retraining is required. • The end user shall be trained on the use of designated area.	• Workers exposed to fall hazards from heights and using FP equipment shall be trained by Competent Person for Fall Protection who is qualified in delivering FP training. • Retraining shall also be provided as necessary. • Employer shall verify worker training by a written certification record including name of worker, date of training and signatures of	• States that FP training is required.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
			trainer and trainee. • Training of all personnel involved in the FP program including associated trainers shall be in accordance w/ANSI Z359.2.	
Horizontal Lifeline	• Designed prior to use by a registered professional engineer with experience in designing horizontal lifeline systems and as part of a complete fall arrest system that maintains a safety factor of at least two.	• Shall be designed and installed as part of a complete fall arrest system, which maintains a safety factor of at least **2** under the supervision of a qualified person.	• HLL shall be installed and used under the supervision of qualified person for Fall Protection only, as part of a complete fall arrest system that maintains a safety factor of at least two.	• Designed, installed, and used under the supervision of a qualified person and used as part of a complete personal fall arrest system that maintains a safety factor of at least two.
Positioning System Requirement	• Limit the free fall distance to 2 feet. • Secured to an anchorage capable of supporting twice the potential impact loading or 3,000 lbs. whichever is greater. • In addition to positioning system,	• Requirements are similar to 29 CFR 1926, Subpart M. • Anchorages for personal FP system must be capable of supporting at least 5,000 lbs. which	• Be rigged such that a worker cannot free fall more than 2 feet. • Secured to an anchorage capable of supporting at least twice the	• Shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 lbs.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
	requires the use of a separate system that provides back-up	includes positioning anchorages	potential impact load of a worker's fall or 3,000 lbs. whichever is greater • In addition to positioning system, requires the use of a separate system that provides back up.	whichever is greater. • Shall be rigged such that an employee cannot free fall more than 2 feet.
Restraint Anchorages	• Anchorage strength requirement shall be 3,000 lbs. or designed by a qualified person for FP for two times the foreseeable force. • Restraint system shall be used only on sloped surfaces equal or less than 18.4 degrees (4:12 slope)	• Anchorages for personal FP systems must be capable of supporting at least 5,000 lbs. which includes Restraint anchorages	• Anchorage strength requirement shall be 3,000 lbs. or designed by a qualified person for FP for two times the foreseeable force. • Restraint system shall be used only on sloped surfaces equal or less than 18.4 degrees (4:12 slope).	• Anchorages shall have the capacity to withstand at least 3,000 lbs. of force or twice the maximum expected force. (*)
Inspection, storage, care, and maintenance of FP equipment	• Before each use, the user shall carefully inspect the FP equipment.	• FP equipment shall be inspected prior to each use; employer should obtain	• Equipment shall be inspected by the end-user prior to each use.	• Personal fall arrest system shall be inspected prior to each use for

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
	• The Competent Person for Fall Protection must inspect the FP equipment at least annually with documentation.	comprehensive instructions from the supplier method of inspection, use cleaning and storage.	• A Competent Person for FP shall inspect the equipment at least once semi-annually and whenever equipment is subjected to a fall or impacted. • Competent Person for FP inspection shall be documented.	wear, damage and other deteriorations.
Climbing Ladder Fall Arrest System Requirements (Previously named Ladder Safety System or Ladder Safety Device (LSD)	• Installed on fixed ladders more than 24 feet in length. • Anchorage strength 3000 lbs. • Free fall distance shall not exceed 2 feet. • Length of connector between D-ring and LCD shall be 9 inches • Requires 100% transition at top of ladder. • Do not install LCD on ladders having ¾-inch rungs unless they are	• Installed on fixed ladders more than 24 feet in length. (Final Rule) • LCD shall meet the design requirements of the ladders, which they serve.	• Installed on fixed ladders more than 24 feet in length. • Anchorage strength 3000 lbs. • Free fall distance shall not exceed 2 feet. • Length of connector between D-ring and LCD shall be 9 inches. • 100% transition at top of ladder. • Do not install LCD on ladders	• Installed on fixed ladders more than 24 feet in length. • Capable of withstanding a drop test of 500 lbs. • Free fall distance shall not exceed 2 feet. • Length of connector between D-ring and LCD shall be 9 inches.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
	designed to withstand the fall forces.		having ¾-inch rungs unless they are designed to withstand the fall forces.	
Rescue procedures	• When using fall arrest equipment, ensure mishap victim can self-rescue or can be rescued promptly should a fall occur. • Personnel conducting rescue shall be trained. • Anchorages for self-rescue and assisted-rescue shall be identified and selected. • Anchorages selected for rescue shall be capable of withstanding static loads of 3,000 lbs. or 5 times the applied loads as designed by Qualified Person for Fall Protection. • Buddy system (Safety person or spotter) is required.	• The employer shall provide for prompt rescue of employees in the event of a fall or shall assure the self-rescue capability of employees.	• Requirement to provide prompt rescue to all fallen workers. • A rescue plan shall be prepared and maintained. • Personnel conducting rescue shall be trained. • Anchorages for self-rescue and assisted-rescue shall be identified and selected. • Anchorages selected for rescue shall be capable of withstanding static loads of 3,000 lbs. or 5 times the applied loads as designed by Qualified Person	• The employer shall provide for prompt rescue of employees in the event of a fall or shall ensure that employees can rescue themselves.

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
			for Fall Protection. • Buddy system (Safety person or spotter) is required. • If other methods of rescue are planned (Fire Department) it shall be indicated in the rescue plan. • All FBHs shall be equipped w/suspension trauma preventers such as stirrups, relief steps or similar in order to provide short-term relief from the effects of orthostatic intolerance. • Note: The QP or CP may determine that specific tasks or activities (e.g. only climbing single anchor	

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
			vertical lifeline system or using restraint system) may not require suspension trauma preventers.	
Warning Line system/Designated Area	• Consists of wire rope or chains 34 - 39 inches high. • Tensile strength of the line shall be min 500 lbs. • Stanchions shall be capable of withstanding a force of 16 lbs. applied horizontally 30 inches from the walking working surfaces. • For roofing work, the line shall be erected 6 feet away from the edge. For other trades the line shall be 15 feet away from the edge.	• The OSHA Final Rule uses the designated area for general industry work, which is similar to the requirements of warning line system. • For Temporary infrequent work, the line shall be established 6 feet away from the unprotected edge of a roof with a 100% transition from the point of access to the designated area. • For other work, the line shall be established 15 feet	• Consists of wire rope or chains 34-39 inches high. • Tensile strength of the line shall be min 500 lbs. • Stanchions shall be capable of withstanding a force of 16 lbs. applied horizontally 30 inches from the walking working surfaces. • For roofing work, the line shall be erected 6 feet away from the edge. For other trades the line shall be 15	• Consists of wire rope or chains 34-39 inches high. • Tensile strength of the line shall be min 500 lbs. • Stanchions shall be capable of withstanding a force of 16 lbs. applied horizontally 30 inches from the walking working surfaces. • For roofing work, the line shall be erected 6 feet away from the edge. For other trades the line shall be 15

Requirements	Navy FP Chapter 13 of OPNAVINST 5100.23/5100.19 Marine Corps Chapter 18, of NAVMC DIR 5100.8, Fall Protection Program	29 CFR 1910 General Industry Standards Subpart D Walking working surfaces and Subpart I, Personal FP Systems	USACE EM385-1-1 Section 21 Fall Protection	29 CFR 1926 Construction Standards
		away from unprotected edge.	feet away from the edge.	feet away from the edge.
Controlled Access Zones	• Not addressed in OPNAVINST 5100.23/5100.19. The system is addressed in the FP Guide. • The system shall not be used as a Fall Protection method.	• Not addressed	• Prohibited as a Fall Protection method.	• Allowed by Subpart M.
Monitoring system	• Monitoring system shall not be used by itself as a Fall Protection method. May be used in conjunction with other Fall Protection system. • Not addressed in OPNAVINST 5100.23/5100.19H. Addressed in the FP Guide. • Prohibited as a Fall Protection system	• Not addressed.	• Prohibited as a Fall Protection system.	• Allowed per Subpart M.

(*) As per OSHA Interpretation Letter

APPENDIX C-Sample Written Fall Protection Program

NOTE: The sample program template provided here must be tailored to reflect the work at height requirements of the command. Additionally, the survey forms, training records, fall prevention plans, and all other required documentation must be completed and amended to the written fall protection program in order for the plan to be in compliance with OPNAV requirements.

From: Commanding Officer [NAVY/MARINE CORPS Command/Activity]

To: All [NAVY/MARINE CORPS Command/Activity] Employees

Subj: [NAVY/MARINE CORPS Command/Activity] FALL PROTECTION PROGRAM MEMORANDUM

References:

(a) OPNAVINST 5100.23, Series
(b) OPNAV M-5100.23, Series
(c) OPNAVINST 5100.19, Series
(d) MCO 5100.29, Series
(e) NAVMC DIR 5100.8, Occupational Safety and Health Program Manual
(f) Department of the Navy Fall Protection Guide
(g) American National Standards Institute (ANSI) Z359 Fall Protection Code/Standards
(h) OPNAVINST 5102.1 Series, Navy and Marine Corps Mishap and Safety Investigation, Reporting and Record Keeping
(i) USACE EM 385-1-1 Safety and Health Requirements Manual
(j) 29 CFR 1926.500, Fall Protection in Construction
(k) 29 CFR 1910, Subpart D, Walking/Working Surfaces
(l) 29 CFR 1910.140, Subpart I, Personal Fall Protection Systems
(m) 29 CFR 1915, Occupational Safety and Health Standards for Shipyard Employment
(n) 29 CFR 1917, Marine Terminals
(o) 29 CFR 1918, Safety and Health Regulations for Longshoring
(p) Any other applicable instructions or manuals

Enclosures:

(1)Fall-Hazard survey and assessment report
(2)Fall Protection and prevention plan
(3)Fall-arrest rescue plan

Purpose

The purpose of this memorandum is to establish a Fall Protection program and provide policy and requirements for the implementation of the program and to establish procedures on Fall Protection and fall prevention for ***[NAVY or MARINE CORPS Commands/Activity]*** personnel working at heights and exposed to Fall-Hazards while conducting maintenance, inspection and investigation work.

Applicability

This memorandum applies to ***[NAVY or MARINE CORPS Command/Activity]*** personnel who are working at heights and exposed to Fall Hazards while conducting construction, maintenance, or inspection and investigation work, and other personnel involved in the Fall Protection Program.

Background

Falls from elevation are the leading cause of injuries and fatalities in the work place. Thousands of workers suffer injuries due to falls, resulting in lost time Appendix C direct all Navy and Marine Corps activities to establish a managed Fall Protection Program, which include identification, elimination, prevention or control of Fall Hazards, wherever practical, through engineering controls, training of personnel, proper installation and use of Fall Protection systems, and required rescue equipment and procedures.

The nature of our work requires that ***[NAVY or MARINE CORPS Command/Activity]*** personnel work at heights and to possibly be exposed to potential Fall Hazards, or be exposed to falling onto dangerous equipment from any height. Not all ***[cranes, buildings, roofs, structures, aircraft surfaces, shipboard spaces or access to cranes or equipment]*** have fully guarded working platforms, guardrails, walkways, or OSHA compliant ladders. Additionally, workers are frequently required to access areas that have unprotected walking working surfaces. Therefore; alternate Fall Protection methods, including fall-arrest gear, alternate safe access methods, and/or restrictions on access are required.

Command Fall Protection Policy

1. **The** ***[NAVY or MARINE CORPS Command/Activity]*** is committed to provide a safe work environment for its personnel exposed to Fall-Hazards, and that the safety of all personnel including military and civilian personnel during performance of their work is of the utmost importance.
2. ***[NAVY or MARINE CORPS Command/Activity]*** personnel must take every reasonable precautionary measure to protect themselves and others during performance of their work.

Requirements

1. ***[NAVY or MARINE CORPS Command/Activity]*** **personnel who might be exposed to Fall Hazards and using Fall Protection equipment must read and understand the requirements of this memorandum; of references (a) thru (e), as applicable.**
2. ***[NAVY or MARINE CORPS Command/Activity]*** **personnel exposed to Fall Hazards shall comply with the requirements of references (a) thru (e), as applicable, including being protected from Fall Hazards when on any elevated walking working surface with unprotected sides, edges, holes, and openings from which there is a possibility of falling *[insert applicable threshold height]* 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.**
3. ***[NAVY or MARINE CORPS Command/Activity]*** **shall have an assigned Fall Protection Program Manager. A Fall Protection Program Manager is a person assigned by the command**

who is responsible for the development and implementation of the Fall Protection Program. The *[NAVY or MARINE CORPS Command/Activity's]* Fall Protection Program Manager must ensure that all personnel exposed to Fall Hazards, and using Fall Arrest equipment and other personnel involved in the program, receive adequate training.

4. Personal Fall Protection equipment used by *[NAVY or MARINE CORPS Command/Activity]* personnel must comply with the requirements of references (a) thru (e) and (f), as applicable.

5. *[NAVY or MARINE CORPS Command/Activity]* personnel exposed to Fall Hazards must be trained in fall prevention and Fall Protection in accordance to the requirements in reference (a) thru (e). Other personnel involved in Fall Protection program also must receive Fall Protection training in accordance to the requirements in references (a) thru (e) and (f), as applicable.

6. Anchorages identified and used by *[NAVY or MARINE CORPS Command/Activity]* personnel for Fall Arrest equipment must comply with the requirements in reference (a) thru (e).

7. Inspection, storage, care, and maintenance of *[NAVY or MARINE CORPS Command/Activity]* Personal Fall Protection Equipment must comply with the requirements of references (a) thru (e), (f), and OPNAVINST 4790.16 Series, and the inspection, storage, care and maintenance instructions by the Fall Protection equipment manufacturers.

8. Falls-from-heights mishaps experienced by *[NAVY or MARINE CORPS Command/Activity]* personnel must be reported if they meet the reporting criteria of reference (d). When fall-arrest equipment used by *[NAVY or MARINE CORPS Command/Activity]* personnel is deployed or activated during a fall, it must be reported as a fall-mishap using the Hazard Report in reference (d).

9. References (a) thru (e) require a *"Fall Protection and Prevention Plan" prepared* as part of a managed Fall Protection Program when Fall Arrest/restraint or positioning systems are used to provide Fall Protection. For routine and predictable tasks, a site-specific *"Fall Protection and Prevention Plan"* must be prepared and used. For non-routine, infrequent and emergency tasks, where personal Fall Protection systems are used, *[NAVY or MARINE CORPS Command/Activity]* personnel may prepare and use a generic *"Fall Protection and Prevention Plan"* for the type of *[NAVY or MARINE CORPS Activity]* work [unprotected side or edge of a building, structure, *crane or equipment]* being climbed or accessed at heights *(e.g. equipment on roofs, towers, poles, portal crane, floating crane, overhead traveling crane, mobile crane, etc.).* The site-specific and generic plan must be prepared in advance either by a Competent Person (CP) for Fall Protection or a Qualified Person (QP) for Fall Protection as defined in reference (a). For a sample *"Fall Protection and prevention plan",* see section 7.2.3 or utilize the checklist in section 7.2.4 of reference (b) and include it as enclosure (1) of the written Fall Protection program. Reference (a) requires each Navy *command/*activity to survey the workplace to identify potential Fall-Hazards and prepare "*Fall-Hazard survey report*". For sample *"Fall-Hazard survey report"* see section 5.4 or utilize the checklist in section 5.5 of this guide and include it as enclosure (2) of the written Fall Protection program. Prior to visiting a site at another Navy Activity, *[NAVFAC Activity]* employees who will be climbing or accessing equipment to conduct inspection, maintenance or repair work at heights shall review the Navy Activity's *"Fall Hazard Survey Report"* for the *[crane/equipment being climbed or roofs and other work areas at heights]*. *[NAVY or MARINE CORPS Command/Activity]* pre-visit

letters sent to the activity in advance of scheduled visits is a method that can be used to obtain a copy of the Navy Activity's *"Fall Hazard Survey Report".* If the *"Fall Hazard Survey"* or knowledge from previous site visits indicates that there are Fall Hazards unique to the particular *[crane, equipment, roof, tower etc.]* being climbed or accessed (e.g. walkways or platforms without OSHA compliant guardrails, missing swinging gates or chains, OSHA noncompliant step-across opening, etc.); then the generic *"Fall Protection and Prevention Plan"* must be modified by the employee or other team leader in consultation with the Competent Person for Fall Protection addressing, eliminating, preventing or controlling these specific Fall Hazards, thus becoming a site-specific *"Fall Protection and Prevention Plan".*

10. Following a fall from a height, the end-user of Fall Protection, who is wearing a full-body harness that is properly secured to an anchorage, may be suspended in the harness for a length of time, if self-rescue or assisted rescue by co-workers cannot be performed quickly. Sustained immobility while arrested in a full body harness may lead to suspension trauma also known as harness-induced pathology as described in reference (b). Suspension trauma results from the accumulation of blood in the veins commonly called venous pooling. The symptoms (known as orthostatic intolerance) of suspension trauma include light-headedness, dizziness, weakness, and occasionally fainting. The reduction in quantity and/or quality (oxygen content) of blood flowing to the brain leads to unconsciousness and harmful effects to other vital organs. If these conditions continue, they potentially may be fatal. *[NAVY or MARINE CORPS Command/Activity]* end-users of Fall Protection must be trained in the methods for minimizing the effect of delaying suspension trauma if an end-user is suspended in a full body harness and unable to perform a self-rescue, and needs to wait to be rescued (e.g., keep legs moving and raise knees into the body to help prevent the pooling of blood in the legs). *[NAVY or MARINE CORPS Command/Activity]* employees must carry, attached to their full-body harness, a suspension trauma safety system furnished to them as part of their Fall Protection gear. These safety straps allow employees suspended in a body harness after a fall to insert their feet and stand up to relieve the pressure of harness straps on their thighs, and helps blood circulation until rescued. Note: These straps are safety devices that will help under ideal conditions. They cannot be solely relied upon - there might be a situation where an injury or medical condition occurs before or during the fall, incapacitating the employee suspended in the full body harness, thus not allowing the use of the suspension trauma safety system. In this situation, the rescue plan shall include requirements for additional rescue and evacuation procedures.

11. Reference (a) states that commands must ensure a mishap victim can self-rescue or can be rescued promptly should a fall occur. *[NAVY or MARINE CORPS Command/Activity]* personnel performing work at different Navy activities where the capabilities of the jurisdictional public or Government-emergency response agencies to rescue an employee suspended in a full body harness after a fall vary greatly; therefore prior to visiting a site at a Navy Activity, *[NAVY or MARINE CORPS Command/Activity]* employees who will be using fall-arrest equipment must review the Navy Activity's *"Fall-arrest Rescue Plan"* for the site location of the *[crane equipment, tower and other structures]* being climbed. A *[NAVY or MARINE CORPS Command/Activity]* pre-visit letter sent to the activity in advance of a scheduled visit is a method that can be used to obtain a copy of the Navy Activity's *"Fall-arrest Rescue Plan".* If the Navy Activity's *"Rescue Plan"* does not show that the jurisdictional

public or Government-emergency response agencies, or an alternative/supplemental rescue method (e.g., a man-lift with a readily available operator) can rescue an employee suspended in a body harness after a fall within 10–15 minutes; then *[NAVY or MARINE CORPS Command/Activity]* employee(s) must not climb or access that [*crane/equipment/tower/pole*] if climbing or accessing that [*crane/equipment/etc.*] requires the use of fall-arrest equipment. For a sample *"Fall-arrest Rescue Plan,"* see section 10.14, and include it as enclosure (3) to the written Fall Protection program.

***[NAVY or MARINE CORPS Command/Activity]* Assigned Personnel for the Fall Protection program:**

Assigned Fall Protection Program Manager: _____

Designated Competent Person for Fall Protection: _____

(Signature_____)
Commanding Officer

Copy to:

APPENDIX D-Fall Protection Program Compliance and Audit Checklist

OPNAV M-5100.23 Series, OPNAVINST 5100.19 Series, MCO 5100.29 Series, or NAVMC DIR 5100.8, Chapter 18 FALL PROTECTION PROGRAM/AUDIT CHECKLIST COMPLIANCE CHECK LIST For COMMANDS HAVING PERSONNEL PERFORMING WORK AT HEIGHTS, EXPOSED TO FALL-HAZARDS AND USING PERSONAL FALL PROTECTION EQUIPMENT	Date of Audit:
Unit	Command
Prepared/Audited by (Signature)	Location

	FALL PROTECTION PROGRAM POLICY	Yes	No	N/A
1	Does the Command have personnel working at heights, exposed to Fall-Hazards above the 4 feet (5 feet Shipboard/Afloat) threshold height limits? Is there a possibility of a fall from any height onto dangerous equipment, into a hazardous environment, or onto an impalement hazard? If the answer to the above is **yes**, a Fall Protection program is required to be established and implemented.			
	BASIC PROGRAM REQUIREMENTS			
2	Did the Commanding Officer, Director, Officer In-Charge or equivalent sign the written program?			
3	Does the written program include site-specific-Fall Protection requirements or local policies?			
	COMMAND/ACTIVITY POLICY (additional requirements)			
4	Is there a need for the activity to have additional supplementary requirements above and beyond the requirements stated in OPNAV M-5100.23 Series, OPNAVINST 5100.19 Series, or MCO 5100.23 Series?			
	DUTIES AND RESPONSIBILITIES			
5	Did the Command delineate duties and assigned responsibilities for personnel involved in the Fall Protection program; including Program Manager, Competent and Qualified Persons (if applicable) for Fall Protection, in the implementation of a managed Fall Protection program?			
6	Are the assigned personnel trained IAW OPNAV M-5100.23 Series, OPNAVINST 5100.19 Series, OPNAV 3500.39 Series, and MCO 5100.29 as applicable, and have the necessary skills, knowledge, and expertise to manage, administer, and implement the Fall Protection Program safely?			
	WORKPLACE SURVEYS AND ASSESSMENT OF FALL HAZARDS			
7	Has a survey been conducted for each Fall-Hazard at existing buildings, facilities, spaces, structures, or other workplaces and a Fall-Hazard Survey Report prepared?			
8	Was Fall-Hazard analysis performed to determine the hazard severity and fall mishap probability IAW OPNAV M-5100.23 Series, OPNAVINST 5100.19 Series, OPNAV 3500.39 Series, and MCO 5100.29, as applicable?			

9	Are one or more Fall Protection methods identified in the survey report to eliminate, prevent or control each Fall Hazard?			
10	Are one or more Fall Protection methods identified in the survey report to eliminate, prevent or control each Fall-Hazard?			
11	For personnel conducting inspection and investigation work of roof surfaces or inspecting and investigating workplace conditions on roofs (e.g. inspection of mechanical equipment), have they received proper training to conduct the work safely, prior to accessing the roof? (N/A Afloat)			
12	Has the Fall Hazard survey and assessment been validated annually for comparison purposes?			
	FALL PROTECTION AND PREVENTION			
13	For personnel exposed to Fall-Hazards and using personal fall-protection equipment (not otherwise protected by passive Fall Protection system such as guardrails), has a Site-specific Fall Protection and Prevention Plan been prepared? (It is recommended to prepare a generic Fall Protection and prevention plan for non-routine and infrequent tasks [e.g., emergency tasks]). The plan shall be updated as conditions change.			
14	Is the Fall Protection and prevention plan prepared either by the designated Competent Person or Qualified Person for Fall Protection? If the plan includes Fall Protection components or systems requiring direction, supervision, design calculations, or drawings by the Qualified Person for Fall Protection, are the name, qualifications and responsibilities of the Qualified Person included?			
15	Does the plan describe in detail the specific practices, equipment, methods and procedures to be used for the protection of workers from falling to a lower level, and the inspection requirements?			
	FALL HAZARD PREVENTION AND CONTROLS			
	PREFERRED ORDER OF CONTROL MEASURES			
16	Have the Fall-Hazards been evaluated to determine the preferred order of control measures for selecting the appropriate Fall Protection method (i.e. elimination, prevention, or control)?			
17	Can Fall-Hazards be eliminated by alternate work methods or changing task(s) or process(s)?			
	SELECTION OF FALL PROTECTION MEASURE			
18	Is the most appropriate Fall Protection method selected in accordance with the preferred order of control measures and compatible with the type of work being performed?			
	STANDARD GUARDRAIL SYSTEMS			
19	When guardrails are used, do they comply with the specified requirements for height, strength and minimum material of construction?			
20	When perimeter cables are used at unprotected sides or edges, as a method of attaching a lanyard to the cables and also used as guardrails, do they meet the design requirements for horizontal lifelines?			

	Did the Qualified Person for Fall Protection design the system including anchorages of the horizontal lifeline system?			
	SAFETY NET SYSTES (N/A AFLOAT)			
21	Does the safety net installation meet the specified criteria and requirements, including the size of the mesh openings and the strength of the outer rope or webbing?			
22	Has the safety net been tested in a suspended position with 400 pounds test weight immediately after installation and under the supervision of a Qualified Person for Fall Protection?			
23	If a safety net was relocated, repaired or left in place for more than 6 months, was it retested in suspension under the supervision of Qualified Person?			
24	Was the inspection of the safety net performed by a Competent Person for Fall Protection per manufacturer's instructions and recommendations?			
25	Inspection of safely nets must be performed immediately after installation, weekly thereafter, and following any alteration or repair. Has the inspection been documented?			
	COVERS			
26	If covers are used to cover a hole 2 inches or more in its least dimension, are they capable of withstanding without failure, at least twice the combined weight of the worker, equipment and material that will pass over it? When temporary covers are used, are they secured in place and clearly marked or color-coded?			
	WORK PLATFORMS			
27	When working from elevated work platform, is the platform equipped with guardrail or other Fall Protection system? Is the work platform maintained properly?			
	ACTIVE FALL PROTECTION SYSTEM			
	PERSONAL FALL ARREST SYSTEMS			
28	Do all personal Fall Arrest systems and equipment used meet ANSI/ASSP Z359 Fall Protection Code/Product Standards? Are all personal fall arrest systems and equipment used listed on the appropriate AEL Afloat?			
29	When selecting personal Fall arrest system, is the free-fall distance, total fall distance, available and required clearances taken into consideration?			
30	Do the snaphooks and carabiners used meet ANSI Z359.12 Standard? (Snaphooks and carabiners and other connectors not meeting at least ANSI/ASSE Z359.1-2007 are not authorized for use and shall be taken out of service.)			
31	For workers having body weight outside the capacity range of 130-310 lbs. and using Personal Fall Protection equipment, is it permitted in writing by the manufacturer?			
32	If it is necessary to increase the free-fall distance beyond 6 feet (e.g. Tying at the feet level) and limiting the maximum arresting force on the body under 1,800 lbs.¸ are 12ft. free fall lanyards being used? There are two types of energy absorbing lanyards, the 6 ft. free fall and 12 ft. free fall. When the tie off point is located above the dorsal D-ring use the 6 ft. free fall energy absorbing single or "Y" lanyards.			

	When the tie-off point is located below the dorsal D-ring, use the 12 ft. free-fall energy absorbing single or "Y" lanyards.			
33	If the sternal D-ring attachment point on the full body harness (located at the sternum) is used as an alternative fall-arrest attachment in applications where the dorsal attachment is determined to be inappropriate by the Competent Person for Fall Protection and where there is no chance to fall in a direction other than the feet first? When using the sternal D-ring attachment for alternative fall-arrest, is the worker exposed to a free-fall distance of less than two feet?			
34	Has the CP evaluated equipment from different manufacturers to ensure they are combatable prior to use?			
35	Is the proper Self Retracting Device (SRD) selected and used, taking into consideration if the equipment is used in a horizontal or vertical application? There are four types of manufactured SRDs, self-retracting lanyard (SRL) used only in vertical applications, SRL with leading edge Capability used in vertical and horizontal applications, SRL for rescue and a hybrid component of any two of the above SRDs.			
36	The unused leg of the "Y" lanyard shall not be attached to any part of the harness, except to attachment points specifically designated by the manufacturer. Has the manufacturer of the equipment designate such attachment points (Full body Harness shall be equipped with at least one Lanyard Parking Attachment Element)?			
	TRAVEL RESTRAINT SYSTEMS			
37	In a restraint system, the End User must be using a full body harness and the proper length of the lanyard. Does the lanyard used have the proper length to prevent the worker from reaching the unprotected side or edge? When using a restraint system, is the lanyard length short enough (or adjustable) to prevent a worker from being exposed to a Fall Hazard?			
	POSITIONING SYSTEMS Note: Positioning system is not considered an Active Fall Protection System			
38				
	CLIMBING LADDER FALL ARREST SYSTEM			
39	When using climbing-ladder Fall Arrest System for ascending or descending on fixed ladders or structures, is the length of the carrier sleeve (the connection between the body harness and the carrier) 9 inches long? Will the system stop the fall within two feet from the onset of a fall? Prior to installation, has the ladder (to which the climbing device will be attached to), been designed to withstand the forces generated by the fall of the climber?			

	OTHER ENGINEERED FALL PROTECTION SYSTEM			
40	Are commercially available engineered/integrated Fall Protection systems designed, installed, certified and used only under the supervision of QP and used per manufacturer instructions and recommendations? Did the CP (if deemed appropriate by a QP), supervise the assembly, disassembly, use and inspection of the engineered system, under the direction of the QP? Did the design include drawings, required clearance, instructions on proper installation, use and inspection requirements?			
	PERSONAL FALL PROTECTION EQUIPMENT SELECTION CRITERIA			
41	Does the selected personal Fall Protection equipment meet the latest ANSI Z359 Fall Protection Code/Standards? **(Newly acquired equipment must meet the latest applicable product standard under the ANSI/ASSP Z359 Fall Protection Code. Currently owned or maintained equipment not meeting at least ANSI/ASSE Z359.1-2007 is not authorized for use.** Electrically rated harnesses shall meet ASTM F887 Standard			
	TRAINING			
42	Does the Fall Protection training for all personnel involved in the Fall Protection Program comply with OPNAV M-5100.23 Series, OPNAVINST 5100.19 Series, MCO 5100.29 Series, and ANSI Z359.2 Standard?			
43	Are authorized/end user trained by a Competent Person for Fall Protection who is qualified to deliver the initial training on the safe use of Fall Protection and rescue equipment, including hands-on and practical demonstrations (performance assessment) and IAW OPNAV M-5100.23 Series, OPNAVINST 5100.19 Series, and MCO 5100.29 Series?			
44	Did the assigned Competent and Qualified Persons for Fall Protection and rescue receive adequate training IAW OPNAV M-5100.23 Series, OPNAVINST 5100.19 Series, and MCO 5100.29 Series?			
45	Did end-users receive refresher/update training on the safe use of Fall Protection equipment once every two years? Did the Competent Person for Fall Protection receive refresher/update training to stay current with the Fall Protection and educational requirements once every two years? Did the Competent Rescuer for Fall Protection receive refresher/update training to stay current with the Fall Protection and educational requirements once every two years? Did other personnel involved in the Fall Protection Program receive refresher/update training as specified in OPNAV M-5100.23 Series, OPNAVINST 5100.19 Series, and MCO 5100.29 Series? Has the above training been documented and verified with a certificate of training?			

	ANCHORAGES FOR PERSONAL FALL PROTECTION EQUIPMENT			
46	For certified fall arrest anchorages selected/identified and designed by a Qualified Person for Fall Protection, are they capable of supporting at least twice the maximum arresting force? For non-certified fall-arrest anchorages selected by a Competent Person for Fall Protection, are they capable of supporting a minimum force of 5,000 pounds per person attached?			
47	For non-certified restraint anchorages selected by a Competent Person for Fall Protection, are they capable of supporting 1,000 pounds per employee attached? For non-certified positioning, climbing ladder fall-arrest system and rescue anchorages selected by a Competent Person for Fall Protection, are they capable of supporting 3,000 pounds per employee attached? For Certified restraint, positioning and climbing ladder fall-arrest system anchorages, are they selected, identified and designed by a Qualified Person for Fall Protection, meeting the requirement of two times the foreseeable force on the worker?			
48	Are the certified horizontal lifeline (HLL) anchorages designed by a registered professional engineer with experience in designing HLL systems; or designed by a Qualified Person for Fall Protection who has appropriate knowledge, training and experience? Non-Certified anchorages are not permitted for use in the HLL System.			
	RESCUE PLAN AND PROCEDURES			
49	For personnel working at heights and using fall-arrest equipment, has a site-specific Fall-hazard rescue plan and procedures been prepared and maintained at the work location?			
50	If self-rescue or assisted-rescue are the planned methods to be used during rescue, did the personnel conducting rescue receive adequate training?			
51	If needed, are certified anchorages for assisted rescue and self-rescue designed for 5 times the intended loading by a qualified person? If needed, are the selected non-certified rescue anchorages selected by a QP or CP having strength of 3,000 lbs.			
52	If the method of rescue will be conducted by the jurisdictional public and Government-emergency response agencies, has a pre-incident plan been developed?			
	INSPECTRION OF PERSONAL FALL PROTECTION EQUIPMENT			
53	Have procedures been established for inspection, storage, care and maintenance of the equipment IAW manufacturer's instructions and recommendations or 3-M maintenance system, whichever is more stringent			
54	Does the Competent Person for Fall Protection inspect the Personal Fall Protection equipment at least annually and w/documentation using sight and touch inspection method? (It is recommended that the Competent Person inspect the equipment semi-annually.)			
55	Does the end-user inspect the Personal Fall Protection Equipment prior to each use using sight and touch inspection method?			

56	Are falls-from-heights mishaps reported in accordance with the reporting criteria of OPNAVINST 5102.1 Series and MCO 5100.29 Series, as applicable?			
	EVALUATION OF PROGRAM EFFETIVENESS			
57	Are procedures in place to audit and evaluate the Fall Protection Program, at least once every two years?			

APPENDIX E-Sample Fall Hazard Survey Report

General information

Activity/Command: _____Date:
Building/Facility # _____
Department: _____
Work Area: _____
Survey Conducted by: _____
Accompanied by: _____

Survey Data

- Fall-Hazard Zone and Type (Description): _____
- Work Location: _____
- Personnel interviewed: _____
- Applicable regulations/Standards: _____
- Type of work performed: _____
- How close is the person to the Fall-Hazard? _____
- Location and distance to obstructions: _____
- Suggested anchorage location, if Fall-Hazard cannot be eliminated or prevented: _____
- Available clearance and total fall distance: _____
- Number of personnel exposed to Fall-Hazard: _____
- Frequency and duration of exposure: _____
- Exposure rating: High _____ Medium _____ Low _____
- Potential severity of a fall: _____
- Any obstructions in the potential fall path: _____
- Access or egress to Fall-Hazard area: _____
- Condition of floor or other surfaces: _____

- Review any mishap reports at the facility: _____
- Any chance of slips trips and same level falls: Yes _____ No _____
- Lock-Out/Tag-Out hazard: _____
- Floor/surface condition: _____
- **Identify the presence of:**
  - Hot objects: _____
  - Sparks: _____
  - Flames: _____
  - Heat producing objects: _____
  - Any electrical/Chemical/RF Transmitter hazards: _____
  - Sharp objects: _____
  - Abrasive surfaces: _____
  - Any moving equipment in the area: _____
  - Impact of weather factors: _____
  - Other maintenance work environment/issues: _____
- **Suggested Fall Protection Solutions:**

Select two of the following probable solutions

  - Guardrails _____
  - Safety nets _____
  - Fall-arrest system _____
  - Travel Restraint system _____
  - Work positioning system _____
  - Horizontal lifeline system/Single anchor vertical lifeline _____
  - Aerial lift equipment/work platforms _____
  - Warning line system/Designated Area Method _____
  - Climbing Ladder Fall-Arrest System _____
  - Raising/lowering devices _____
  - Covers _____

If fall-arrest/restraint/work positioning/Horizontal lifeline/Single Anchor Vertical Lifeline system is selected:

- Anchorage(s) location (if any): _____
- Can rescue be performed if required: _____
- Type of rescue: _____
- Any potential swing Fall-Hazards: _____
- Is the end-user properly trained: Yes _____ No _____
- Other factors: _____

- Fall-Hazard assessment per OPNAVINST 5100.23 Series, chapter 13, or NAVMC DIR 5100.8.

- Any additional information:

_____

_____

- Drawings/Sketches/Photos

- Prepared by: _____

- Approved by: _____

Note:

The above sample survey report is for a single Fall-Hazard location. For a complete survey report at a building, facility, or activity, develop a summary table for all Fall-Hazards and attach the specific survey reports to it.

APPENDIX F-Site Specific Fall Hazard Survey Report

Activity/Command:				**Date:**	
Building/Facility #:				**Work Area:**	
Survey Conducted By:				**Approved By:**	
Fall-Hazard # (1, 2, 3, etc.)	**CR Review**		**FP Program Manager or Competent Person:**		

SURVEY INFORMATION

Major Fall-Hazard Zone or Type:		Work Location:	
Personnel Interviewed:	1.	Guiding Regs:	
	2.	Work Type:	
	3.		
Distance of Personnel from Fall-Hazard (Ft):		Location or Distance to Obstructions (Ft)?	
Suggested Anchorage(s) (if fall-arrest system is utilized):			
Distance to Ground Below (Ft):		Number of Personnel Exposed to Fall-Hazard:	
Frequency/Duration of Fall Exposure:	/	Exposure Risk:	
Potential Severity of Fall:		Obstructions in Fall Path:	
Access or Egress to Fall-Hazard Area (i.e. ladder, AWP, Stairs, etc.)		Condition of Floor/Other Surfaces:	
Historical Fall Mishaps at the Facility?		Lock Out/Tag Out Hazard?	
		Appendix E	
Hot Objects:	☐	Guardrails	
Sparks:	☐	Horizontal Life-Line	☐

			FA Type:	Portable System	☐
				Overhead Beam Strap	☐
Flames:	☐			Self-Retracting Lanyard	☐
				Energy Absorbing Lanyard	☐
Chemical Hazards:	☐		Maintenance Stand or work platforms		☐
Electrical Hazards:	☐		Restraint System		☐
Sharp Objects:	☐		Positioning System		☐
Abrasive Surfaces:	☐		Aerial Lift/Work Platforms		☐
Weather Factor:	☐		Horizontal or Single Anchor Vertical Lifeline System		
Other risk Factors:	☐		Other FP methods		

Anchorage(s) Locations (if Applicable)			
Can Rescue Be Performed if Required?		Type of Rescue:	
Is there a rescue plan prepared?		Explain Other:	
Are End-users Trained on Fall-arrest Systems?		Do Swing Fall-Hazards Exist?	
Additional Information			

APPENDIX G-Fall Protection Training Roster

All personnel signing this form affirm that they understand the Fall-Hazards on the job-site, and that they have been trained in the proper use of, and will use, the selected Fall Protection equipment and methods. Review and sign again, if hazards, methods or work changes.

NAME: ____
ORGANIZATION/CODE/SHOP: __________________________________
TRAINING DATE(s): ____
DURATION OF TRAINING (Hours):_______________________________
COURSE TITLE: ____
DESCRIPTION OF THE COURSE: _________________________________

NAME: ____
ORGANIZATION/CODE/SHOP: __________________________________
TRAINING DATE(s): ____
DURATION OF TRAINING (Hours):_______________________________
COURSE TITLE: ____
DESCRIPTION OF THE COURSE: _________________________________

NAME: ____
ORGANIZATION/CODE/SHOP: __________________________________
TRAINING DATE(s): ____
DURATION OF TRAINING (Hours):_______________________________
COURSE TITLE: ____
DESCRIPTION OF THE COURSE: _________________________________

NAME: ____
ORGANIZATION/CODE/SHOP: __________________________________
TRAINING DATE(s): ____
DURATION OF TRAINING (Hours):_______________________________
COURSE TITLE: ____
DESCRIPTION OF THE COURSE: _________________________________

INSTRUCTOR’S NAME: ______________________________________

INSTRUCTURE’S SIGNATURE: _________________________________

APPENDIX H-Sample Fall Protection and Prevention Plan

Activity/Command:_____**Building/Facility #** _____
Department: _____
Work Area/Location: _____
Plan Prepared by: _____
Date Prepared on: _____
Date Modified: _____
Plan implemented by: _____

Task/Work Description:

_____
_____
_____
_____
_____

Name of personnel exposed to Fall-Hazards: _____
Description of the Fall Protection system to be used: _____
Training Best practices: _____
Anchorage Location and type: _____
Anchorage Strength: _____
Certified/Non-Certified Anchorage(s): _____
Describe the rest of the system used: _____
Describe the set up procedure for access to work location:
_____

Instructions for:
- **Assembly:** _____
- **Use:** _____
- **Disassembly:** _____
- **Inspection Care and Maintenance:** _____

Available and required clearance: _____
Free-fall Distance: _____
Total Fall Distance: _____
Number of personnel using the system: _____
System Limitation: _____
Equipment Inspection Procedure and Intervals: _____
Design of the system (if required)
_____
_____

Manufacturer's standards/drawings including instructions and recommendations:
_____
Any other info: _____
Include rescue plan and procedures: _____

Prepared by: _____

Approved by: _____

APPENDIX I-Fall Protection and Prevention Plan Checklist

GENERAL INFORMATION				
Facility/Building #:	Appendix B	**Phone:**	Appendix B	Appendix B
Detailed Location:		**Plan Prepared By:**		
Dates(s) Plan was Modified:	1. 2. 3.	**This Revision of Plan Implemented on (Date):**		1. 2. 3.
Task/Work Description:				
Name(s) of Personnel Exposed to Fall-Hazards and using Personal Fall Protection Equipment:	1. 2. 3. 4. 5.		6. 7. 8. 9. 10.	
Personal Fall Protection System				
Description of the Fall Protection System to Be Used:		**Identification or Selection of Anchorage(s) & Types:**		
Anchorage Location:		**Anchorage Strength:**		
Certified Anchorages designed by QP		**Required Strength**		
Free-fall distance		**Total fall Distance**		
Required Clearance		**Available and required Clearance**		
Design of FA System (If required)		**Personal Fall Protection System Limitations**		
TRAINING				
Competent and/or Qualified Person for Fall Protection training Completed:		**End-user(s) Training Completed:**		
Program Manager Training Completed				
OTHER INFORMATION				
Include Manufacturer's Instructions and Recommendations for Use, Assembly, Disassembly and Inspection Criteria				
Additional Instructions:				

APPENDIX J-Competent or Qualified Person for Fall Protection Checklist

Navy or Marine Corps Command:	Location		
FP Program Manager:	Date:		
COMPETENT PERSON FOR FP INFORMATION			
TRAINING KNOWLEDGE AND EXPERIENCE	Yes	No	N/A
Does the designated individual have training knowledge and experience in:			
Applicable Fall Protection regulations, standards and Best practices?			
Fall-Hazard recognition (How to recognize and identify Fall-Hazards)?			
Duties and responsibilities of other designated personnel under the FP Program (e.g. Qualified Person, end-user, authorized rescuer, etc.)?			
Conducting Fall-Hazard surveys and preparing survey report?			
The Best practices and criteria for guardrails, safety nets, scaffolds, aerial lifts and movable and stationary work platforms, warning line system/designated area, and safety monitoring system?			
Developing Fall Protection and prevention plans (written Fall Protection procedures). Notes: If the Fall Protection and Prevention plan includes Fall Protection components or systems requiring direction, supervision, design calculations or drawings by a Qualified Person for Fall Protection or a professional engineer, the name, qualifications, responsibilities, training knowledge, experience and signature of the Qualified Person for Fall Protection or professional engineer shall also be addressed in the plan. At a minimum, the Qualified Person/professional engineer information is required when using Horizontal Lifelines, Other Engineered Systems, the anchorages or tie-off points are located below the dorsal D–ring and designing certified anchorages that require being twice the maximum arrest or potential force.			
Fall-arrest, positioning, restraint and climbing ladder fall arrest systems			
Fall-Hazard elimination and control methods including hands-on how to assemble, disassemble and use Fall Protection systems and equipment (Donning of the equipment, equipment installation techniques and proper anchoring and tie-off techniques)?			
Fall Protection system and equipment assessments (e.g. component compatibility, estimating free-fall distances, total fall distance and available and required clearance, and common hazards of each system and component used*)* and determining when a system is unsafe?			

How to conduct detailed inspection storage care and maintenance of equipment, components and systems with documentation?			
Fall Protection rescue equipment and procedures and prepare Fall-Hazard rescue plan?			
The selection and use of non-certified anchorages (e.g. 5,000 lbs. anchorage for FA)?			
Best practices for working over or near water or working from/in machinery over water			
List training/experience including certificate of training:			
AUTHORITY	Yes	No	N/A
Does the designated individual have authority from the Command to: Take prompt corrective action to eliminate existing and predictable fall hazards? Stop work?			

Use of this checklist is optional.

APPENDIX K-Sample Fall Rescue Plan

(Note: Local commands should use the following form format, making sure that they adhere to appropriate local regulations, which may apply)

Date:
Site & Location Identification:
Detailed Location:
Primary Emergency Phone Number:
Type of Phone/Location:
Local Phone Line/Outside Line:
Secondary Emergency Phone Number:
Backup Rescue Lift is Available/Located at:
First Aid kit Location(s):
Fire Extinguishers locations(s):
Nearest Hospital Route and Location:
Procedure for requesting rescue and medical assistance:
Describe Rescue Operation and method:
Type of equipment used (PPE, Ladder, Hoist, etc.)
Name of Personnel Working at Heights:
Self-Rescue Method and Equipment used:
For a person climbing alone, the name of the other person at the activity who will make visual or verbal contact with the end-user at least once every 15 minutes to assure that the user has not fallen.
Anchorages for rescue:
Pre-incident planning with jurisdictional public and Government emergency response agency:
Where work over water is planned, prepare a “Man Overboard” plan and attach as part of the rescue plan.
Additional Comments and Requirements:
Prepared by:
Approved by:

APPENDIX L-Site Specific Fall Rescue Plan Checklist

GENERAL INFORMATION			
Activity/Command:		**Date:**	
Building/Facility #:		**Primary and secondary Phone Numbers:**	
Detailed Location:		**Ladder/Lift Location:**	
	Appendix B	Appendix B	Appendix B
	3.		3.
Nearest Medical Facility and Directions:			
Applicable Local Regulations or Requirements			
Procedure for Requesting Rescue	1.		
	2.		
	3.		
	4.		
Describe Rescue Operation and Method:			
Types of Equipment Used (Ladder, Hoist, Aerial Lift, etc.):			
If Self-Rescue or Assisted Rescue is Planned, Describe Equipment to be used			
Describe if Additional Anchorages for Rescue are Required:			
Has Rescue Plan Been developed in coordination with Local Emergency Services (essential if relying on them to provide rescue)?			
Is a pre-Incident Plan prepared when the planned Method of Rescue is the Fire Department			

Additional Comments:

Prepared By:	
Approved By (FPPM): Add AR review	

APPENDIX M-Fall Protection Equipment Inspection Checklist

Inspected by:_____ (Competent Person's Name)	Date:
Work Area:	Department/Code:

Instructions:
All parts of the Fall Protection system and components are to be checked for excessive wear and damage.
Use the symbol "Y" for yes or OK.
Use the symbol "N" for no or replace.
All equipment must be inspected visually before each use by the end-user and by the Competent Person for Fall Protection at least annually with documentation.
Consult Manufacturer instructions or PMS 3M System for specific inspection requirements

Name or Equip #	Self-Retracting Devices		Lanyards		Full-Body Harnesses			Horizontal Lifeline System		
	Cable	Mechanism	Webbing	Energy Absorber	Webbings	"D" Rings and Connectors	Labeling	Anchorage Connection/ Stanchions	Cable	Hardware

APPENDIX N-Fall Arrest System and Equipment Checklist

Activity/Command:	**Page 2**
Work Area:	**Department:**

Name or Equip. #	**Single Anchor Vertical Lifelines**		**Anchorages/ Anchorage Connectors**		**Climbing Ladder Fall Arrest Systems**			**Snaphooks/Carabiners**		
	Rope/cable	Rope Grabs	Structural Integrity	Anchor Strap, Beam Wall and Roof Anchors	Cable/ Rope/ Rail	Rope Grab	Connections	Gate Locking Mechanism	Any Cracks	Deformation