

# MillerGuide

## Fall Protection Program Considerations



**MILLER**

# INTRODUCTION

***This guide is designed as a quick reference to assist you with preparing and implementing a fall protection program for your company. You will also be introduced to products that can help you protect your workers, comply with regulations governing fall protection, and maintain a successful fall protection program.***

## **The Vital Need for Fall Protection Products**

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

## **Who's Responsible**

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

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

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

# DEVELOPING A FALL PROTECTION PROGRAM

## 1

### Understanding Regulations and Standards

The fall protection industry has been bombarded with regulations and standards. Understanding these requirements is key to ensuring a safe work environment.

The Occupational Safety and Health Act (OSHA) under Title 29 of the Code of Federal Regulations (29 CFR) assures and enforces safe and healthful working conditions for general industry and construction in the United States. Under the Act, employers have the duty of providing their workers with a place of employment free from recognized safety and health hazards. **It's the law.**

The American National Standards Institute (ANSI) and the Canadian Standards Association (CSA) are voluntary organizations made up of manufacturers and consumers that establish product performance standards for fall protection safety. Meeting the standards indicates that products pass accepted testing procedures. The standards are not enforceable as law, however many OSHA regulations are adopted from ANSI standards.

Application of regulatory requirements depends on the specific location, industry and operations of the workplace. In the event of an inspection, the company will be assessed on how well the operation meets the regulatory requirements of each particular job. Employers should obtain copies of the regulations that apply to their work activities and begin a fall protection regulations file by writing to:

**Occupational Safety and Health Administration (OSHA)**  
200 Constitution Avenue, N.W., Washington, DC 20210

**American National Standards Institute, Inc. (ANSI)**  
11 West 42nd Street, New York, NY 10036

**Canadian Standards Association (CSA)**  
178 Rexdale Boulevard, Etobicoke, Ontario, Canada M9W 1R3

## 2 Hazard Identification

A well-conceived fall protection program begins with identification of all fall hazards in the workplace. As a general rule, any time a worker is at a height greater than 4 feet (1.2m), a fall hazard exists. Where a fall hazard exists, there are two acceptable options: (1) eliminate the hazard, or (2) provide protection against it. Ideally, it is best to totally eliminate the hazard. Since that is often not possible, however, other measures such as the wearing of personal protection equipment (PPE) are required.

## 3 Written Fall Protection Program

Following hazard identification, a written program should be developed specifying how to deal with each hazard. If standardized safe-work practices and operating procedures can eliminate the hazard, then such procedures should be specified.

Where hazard elimination is impossible, the plan should state what fall protection measures are to be used, how they are to be used, and who is responsible for overall supervision and training. This program need not be elaborate, but should cover the basic elements of the plan. The program needs to be clearly conveyed and understood by all participants.

## 4 Product Selection

The employer must know the types of fall protection products that are available, and decide which would be most suitable for the workplace. Because all work environments differ, it is impossible for the manufacturer to determine exactly which fall protection products will provide maximum protection for each job. By understanding how fall protection products operate and knowing the differences in product functions, the employer can select products that are best suited for their workers.

## 5 Training

All workers must be trained in the proper use of fall protection equipment before using any fall protection products. Workers must be able to identify potential fall hazards, determine which products to use in specific work environments, demonstrate proper anchoring procedures, etc. Employees must also learn inspection and maintenance procedures and the proper wearing of fall protection equipment.

# THE ABC'S OF A PERSONAL FALL ARREST SYSTEM

**Three key components of the Personal Fall Arrest System (PFAS) must be in place and properly used to provide maximum worker protection.**

## **Anchorage/Anchorage Connector**

**Anchorage:** Commonly referred to as a tie-off point (Ex: I-beam, rebar, scaffolding, lifeline, etc.)

**Anchorage Connector:** Used to join the connecting device to the anchorage (Ex: cross-arm strap, beam anchor, D-bolt, hook anchor, etc.)

- Anchorages must be capable of supporting 5,000 pounds (22kN) of force per worker.
- Must be high enough for a worker to avoid contact with a lower level should a fall occur.

## **Body Wear**

**Body Wear:** The personal protective equipment worn by the worker (Ex: full-body harness)

- Only form of body wear acceptable for fall arrest is the full-body harness.
- Should be selected based on work to be performed and the work environment.
- Ask for a Miller Harness Selection Guide from your nearest Miller distributor.

## **Connecting Device**

**Connecting Device:** The critical link which joins the body wear to the anchorage/anchorage connector (Ex: shock-absorbing lanyard, fall limiter, self-retracting lifeline, rope grab, etc.)

- Potential fall distance must be calculated to determine type of connecting device to be used.
- Should also be selected based on work to be performed and the work environment.

Individually, these components will not provide protection from a fall. Used properly in conjunction with each other, however, they form a Personal Fall Arrest System that becomes vitally important to safety on the jobsite and the overall fall protection program.



# FOUR FUNCTIONAL EQUIPMENT CATEGORIES



## Fall Arrest

As a general rule, it is recommended that a fall arrest system be used at working heights of four feet or more. This system consists of:

- anchorage/  
anchorage connector
- body wear  
(full-body harness)
- connecting device

*\*The positioning and suspension systems are not designed for fall arrest, and therefore a back-up fall arrest system should be used.*



## Positioning/Restraint\*

A positioning/restraint system is used to hold a worker in place while allowing a hands-free work environment at elevated heights and/or restrict the worker's movement to prevent reaching a location where a fall hazard exists. A typical positioning/restraint system consists of:

- anchorage/  
anchorage connector
- body wear (full-body harness  
or body belt)
- connecting device  
(positioning lanyard)



### **Suspension\***

Suspension systems are used widely in the window washing and painting industries and are designed to lower and support a worker while allowing a hands-free work environment. A typical suspension system would include:

- anchorage/anchorage connector (anchor bolt, trolley, carabiner, etc.)
- body wear (full-body harness)
- connecting device (workline)
- suspension device (bos'n chair)



### **Retrieval**

The retrieval system is primarily used in confined space applications where workers must enter tanks, manholes, etc. and may require retrieval from above should an emergency occur. A retrieval system typically consists of:

- anchorage/anchorage connector (tripod, davit)
- body wear (full-body harness)
- connecting device (retractable lifeline/retrieval unit)

# GENERAL FALL PROTECTION CONSIDERATIONS

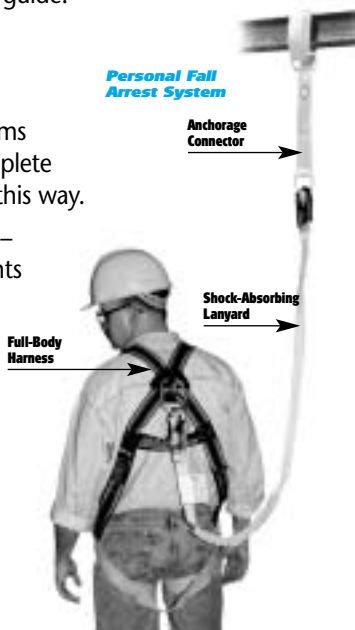
**The following factors are key considerations to provide maximum fall protection safety and to ensure compliance with regulations and standards.**

- 1) Warnings** – Always read all instructions and warnings contained on the product and packaging before using any fall protection equipment.
- 2) Inspection** – All fall protection equipment should be inspected prior to each use.
- 3) Training** – All workers should be trained by a *Competent Person* in the proper use of fall protection products.
- 4) Regulations** – Understand all Federal, State, Local and Provincial regulations pertaining to fall protection before selecting and using the equipment.
- 5) Rescue Planning** – Minimizing the time between a fall occurrence and medical attention of the worker is vitally important. A thorough rescue program should be established prior to using fall protection equipment.
- 6) Product/System Preferences** – If there are any doubts about which fall protection products to use, contact your Miller Distributor or call Miller Customer Service. For guidelines on selecting a basic personal fall arrest system, refer to The ABC's of a Personal Fall Arrest System on page 8 of this guide.

**7) System Components** – Only components that are fully compatible with one another should be used. Fall arrest systems are designed and tested as complete systems and should be used in this way.

**8) What to Do After a Fall** – After a fall occurs, all components of the fall arrest system should be removed from service.

**9) Call for Information** – If there are any questions or concerns about your fall protection program or system, contact Miller/Troll Training at 1-800-873-5242.

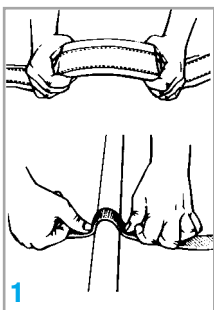


# INSPECTION & MAINTENANCE OF A PERSONAL FALL ARREST SYSTEM

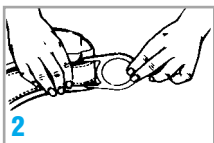
**To maintain proper service life and high performance, fall protection products should be inspected regularly!**

## Harness (and Body Belt) Inspection

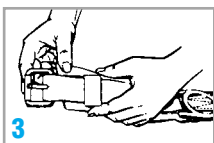
To inspect your harness or body belt, perform the following procedures.



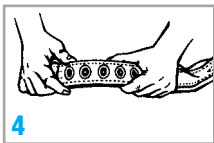
**1) Webbing** – Grasp the webbing with your hands 6 inches (152mm) to 8 inches (203mm) apart. Bend the webbing in an inverted “U” as shown. The surface tension resulting makes damaged fibers or cuts easier to detect. Follow this procedure the entire length of the webbing, inspecting both sides of each strap. Look for frayed edges, broken fibers, pulled stitches, cuts, burns, and chemical damage.



**2) D-Rings/Back Pads** – Check D-rings for distortion, cracks, breaks, and rough or sharp edges. The D-ring should pivot freely. D-ring back pads should also be inspected for damage.



**3) Attachment of Buckles** – Inspect for any unusual wear, frayed or cut fibers, or broken stitching of the buckle or D-ring attachments.

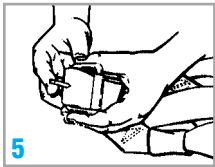


**4) Tongue/Grommets** – The tongue receives heavy wear from repeated buckling and unbuckling. Inspect for loose, distorted or broken grommets. Webbing should not have additional punched holes.

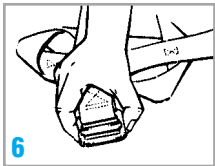
*(Continued on page 14)*

# INSPECTION & MAINTENANCE OF A PERSONAL FALL ARREST SYSTEM *(Continued)*

## Harness (and Body Belt) Inspection *(Continued)*



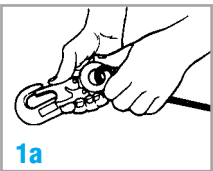
**5) Tongue Buckles** – Buckle tongues should be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. Roller should turn freely on frame. Check for distortion or sharp edges.



**6) Friction and Mating Buckles** – Inspect the buckle for distortion. The outer bars and center bars must be straight. Pay special attention to corners and attachment points at the center bar.

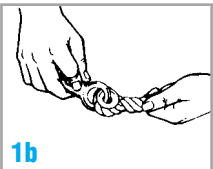
## Lanyard Inspection

When inspecting lanyards, begin at one end and work to the opposite end, slowly rotating the lanyard so that the entire circumference is checked. Additionally, follow the procedures below.



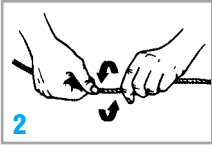
### 1) Hardware –

**a.** Snaps: Inspect closely for hook and eye distortions, cracks, corrosion, or pitted surfaces. The keeper (latch) should seat into the nose without binding and should not be distorted or obstructed. The keeper spring should exert sufficient force to firmly close the keeper. Keeper locks must prevent the keeper from opening when the keeper closes.

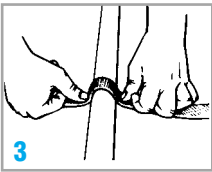


**b.** Thimbles: The thimble must be firmly seated in the eye of the splice, and the splice should have no loose or cut strands. The edges of the thimble must be free of sharp edges, distortion, or cracks.

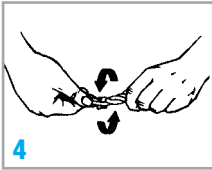
## Lanyard Inspection (Continued)



**2) Wire Rope Lanyard** – While rotating the wire rope lanyard, watch for cuts, frayed areas, or unusual wearing patterns on the wire. Broken strands will separate from the body of the lanyard.



**3) Web Lanyard** – While bending webbing over a pipe or mandrel, observe each side of the webbed lanyard. This will reveal any cuts or breaks. Swelling, discoloration, cracks, and charring are obvious signs of chemical or heat damage. Observe closely for any breaks in stitching.



**4) Rope Lanyard** – Rotate the rope lanyard while inspecting from end-to-end for any fuzzy, worn, broken or cut fibers. Weakened areas from extreme loads will appear as a noticeable change in original diameter. The rope diameter should be uniform throughout, following a short break-in period.



**5) Shock Absorber Pack** – The outer portion of the pack should be examined for burn holes and tears. Stitching on areas where the pack is sewn to D-rings, belts, or lanyards should be examined for loose strands, rips, and deterioration.

**6) Shock-Absorbing Lanyard** – Shock-absorbing lanyards should be examined as a web lanyard (described in item 3 above). However, also look for the warning flag or signs of deployment. If the flag has been activated, remove this shock-absorbing lanyard from service.

(Continued on page 16)

# INSPECTION & MAINTENANCE OF A PERSONAL FALL ARREST SYSTEM *(Continued)*

## **Cleaning**

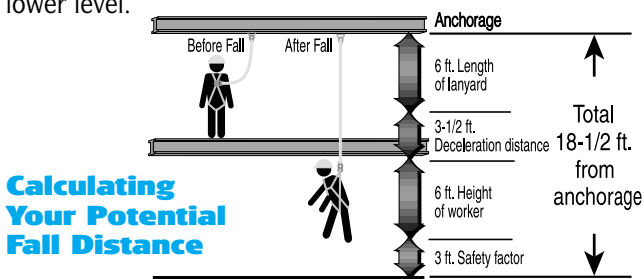
---

Basic care of all safety equipment will prolong the durable life of the unit and will contribute toward the performance of its vital safety function. Proper storage and maintenance after use are as important as cleansing the equipment of dirt, corrosives, or contaminants. Storage areas should be clean, dry and free of exposure to fumes or corrosive elements.

- 1) Nylon or Polyester** – Remove all surface dirt with a sponge dampened in plain water. Squeeze the sponge dry. Dip the sponge in a mild solution of water and commercial soap or detergent. Work up a thick lather with a vigorous back and forth motion; then wipe with a clean cloth. Hang freely to dry, but away from excessive heat.
- 2) Drying** – Equipment should dry thoroughly without close exposure to heat, steam, or long periods of sunlight.

# CALCULATING TOTAL FALL CLEARANCE DISTANCE

Shock-absorbing lanyards extend deceleration distance during a fall, significantly reducing fall arrest forces by 65 to 80 percent below the threshold of injury. This ensures greater safety on the jobsite. However, when using a shock-absorbing lanyard, it is important to understand how to calculate potential fall distance to avoid contact with a lower level.



1. When using a 6 ft. (1.8m) shock-absorbing lanyard and a full-body harness, first add the length of the shock-absorbing lanyard [6 ft. (1.8m)] to the maximum elongation of the shock absorber during deceleration [3-1/2 ft. (1.1m)] to the average height of a worker [6 ft. (1.8m)].
2. Then, add a safety factor of 3 ft. (1m) to allow for the possibility of an improperly fit harness, a taller than average worker and/or a miscalculation of distance.
3. The total, 18-1/2 ft. (5.6m), is the suggested safe fall clearance distance, the height at which you must attach to an anchorage to minimize the risk of contact with a lower level.

## Miller® Splat Indicator

For a quick and easy alternative to calculating your fall distance, use the Miller Splat Indicator.

- Similar to a plumb bob, simply attach the device to an anchorage or to the lanyard at the anchoring snap hook and lower the weight using the attached string.
- If the weight strikes a lower level, then a higher anchorage must be selected.
- If a higher anchorage is not accessible, a shorter lanyard or a fall limiter should be used.



# 6 EASY STEPS THAT COULD SAVE YOUR LIFE:

## How To Put On A Harness



**1** Hold harness by back D-ring. Shake harness to allow all straps to fall in place.



**2** If chest, leg and/or waist straps are buckled, release straps and unbuckle at this time.



**3** Slip straps over shoulders so D-ring is located in middle of back between shoulder blades.



**4** Pull leg strap between legs and connect to opposite end. Repeat with second leg strap. If belted harness, connect waist strap after leg straps.



**5** Connect chest strap and position in midchest area. Tighten to keep shoulder straps taut.



**6** After all straps have been buckled, tighten all buckles so that harness fits snug but allows full range of movement. Pass excess strap through loop keepers.

## GLOSSARY OF TERMS

**Anchorage** – a secure point of attachment for lifelines, lanyards or deceleration devices.

**Anchorage Connector** – used to join the connecting device (lanyard, lifeline, or deceleration device) to the anchorage.

**Arresting Force** – the force transmitted to the body when a fall is arrested. *Also known as Fall Arrest Force.*

**Body Belt** – a strap with means both for securing about the waist and for attaching to a lanyard, lifeline or deceleration device. Used for positioning and/or restraint. *Also known as a Safety Belt.*

**Body Harness** – a design of straps which is secured about a person in a manner to distribute fall arresting forces over at least the thighs, pelvis, waist, chest and shoulders, with provisions for attaching it to other components of a personal fall arrest system. *Also known as a Full-Body Harness.*

**Body Wear** – the personal protective equipment worn by a worker, such as a body belt or body harness.

**Buckle** – an integral connector used to attach straps or webbing segments together or to themselves.

**Friction Buckle** – an integral connector whereby the webbing passes over the knurled bar and back down between the knurled bar and frame to adjust and tighten webbing straps.

**Mating Buckle** – an integral connector whereby a center bar is pushed through a square link. Webbing is then tightened for proper fit. *Also known as a Quick-Connect Buckle.*

**Tongue Buckle** – an integral connector similar to a standard belt buckle whereby a webbing strap is inserted through the buckle placing the buckle tongue through the appropriate grommet hole. *Also known as a Grommet Buckle.*

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

*(Continued on page 20)*

## GLOSSARY OF TERMS *(Continued)*

**Connecting Device** – the critical link which joins the body wear to the anchorage/anchorage connector, such as shock-absorbing lanyard, fall limiter, self-retracting lifeline, or rope grab.

**Connector** – a mechanism or device used to join together components of a personal fall arrest system or parts of a component within the system. *See also Hardware.*

**D-Ring** – an integral component or provision commonly found on body wear and some anchorage connectors which allows for attaching a connecting device (lanyard, lifeline, or deceleration device).

**Deceleration Device** – any mechanism which serves to dissipate energy during a fall arrest, limiting the forces imposed on a person.

**Deceleration Distance** – the additional vertical distance a falling person travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of a person's body harness attachment point at the moment of activation (onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the person comes to a full stop.

**Fall Indicator** – a safety device or warning flag which serves to let an employee know that a fall arrest system component has been involved in a fall and should be removed from service.

**Fall Limiter** – a self-retracting lifeline/lanyard with a quick-activating braking system that limits a free fall to inches. *See also Self-Retracting Lifeline/Lanyard.*

**Free Fall** – the act of falling before the personal fall arrest system begins to arrest the fall.

**Free Fall Distance** – the vertical distance a person falls before the fall arrest system begins to arrest the fall.

**Full-Body Harness** – *See Body Harness.*

**Hardware** – buckles, D-rings, snap hooks and associated connectors which are used to attach components of a personal fall arrest system or parts of a component within the system.

**Lanyard** – a flexible line of rope, wire rope/cable, or webbing which generally has a connector at each end for securing a body belt or body harness to a lifeline, deceleration device or anchorage.

**Lanyard Ring** – a component of a body harness that allows the user to attach a lanyard when not in use so that it is not hanging freely.

**Lifeline** – a line provided for direct or indirect attachment to a body belt, body harness, lanyard, or deceleration device. Such lifelines may be horizontal or vertical in application.

**Lower Level** – an area or surface to which an employee can fall.

**Maximum Arrest Force** – the peak force on the body during arrest of a fall by the fall arrest system. *Also known as Peak Fall Arrest Force.*

**Personal Fall Arrest System** – an arrangement of components that together will arrest a person in a fall from a working level. It typically consists of an anchorage, connecting device and body harness, and may include a lanyard, deceleration device, lifeline or a combination of these.

**Retractable Lifeline** – *See Self-Retracting Lifeline/Lanyard.*

**Rollout** – a process by which a snap hook, carabiner or similar device unintentionally disengages from another component to which it is attached.

**Rope Grab** – a deceleration device which travels on a lifeline and automatically engages the lifeline and locks to arrest a fall.

**Trailing Rope Grab** – a rope grab which moves freely up and down the lifeline with hands-free operation.

**Self-Retracting Lifeline/Lanyard** – a deceleration device containing a drum-wound line which can be slowly extracted from or retracted onto the drum under slight tension during normal worker movement, and which, after onset of a fall, automatically locks the drum and arrests the fall. *See also Fall Limiter.*

*(Continued on page 22)*

## **GLOSSARY OF TERMS** *(Continued)*

**Shock Absorber** – a component of a personal fall arrest system which allows dissipation of energy by extending deceleration distance reducing fall arrest forces.

**Shock-Absorbing Lanyard** – specially designed lanyard that elongates during a fall to significantly reduce fall arresting forces.

**Snap Hook** – a connector with a hook-shaped member, keeper, latch or other similar arrangement which may be opened to receive an object and, when released, automatically closes to retain the object.

**Locking Snap Hook** – a snap hook that includes a locking mechanism which will keep the hook closed and locked until manually unlocked and opened.

**Strap** – a length of webbing.

**Stretchable Harness** – a full-body harness that is more comfortable to wear because the webbing is a blend of nylon, polyester, and a specially formulated elastomer that stretches. Includes provisions for attaching a lanyard, lifeline or deceleration device.

**Sub-Pelvic Strap** – a full-body harness strap, which passes under the buttocks without passing through the crotch, that is designed to transmit forces applied during fall arrest or post-fall suspension to the sub-pelvic part of the body.

**Tie-Back Lanyard** – a flexible line of heavy-duty, abrasion-resistant webbing designed to be used as the connecting device and anchorage connector with a specially-engineered snap hook able to withstand 5,000 lbs.

**Total Fall Clearance Distance** – the maximum vertical distance that a worker could potentially fall and still avoid contact with a lower level.

**Total Fall Distance** – the maximum vertical distance between the full-body harness attachment point and the lowest extremity of the body before and after the fall is arrested including lanyard extension and/or deceleration distance.