

THE MILLERGUIDE TO FALL PROTECTION PROGRAMS



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Training Where to Turn for Advice





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.

INTRODUCTION

DEVELOPING A FALL PROTECTION PROGRAM

Fall protection requires a "total systems approach." In order to be effective, all parts of the system must be in place and working together. The following factors must be addressed when developing a successful fall protection program:

Understanding Regulations and 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. Copies of regulations and standards may be obtained by writing to:

Occupational Safety and Health		
Administration (OSHA)		
200 Constitution Avenue, NW.		
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

RESOURCES FOR REGULATIONS, ADVISEMENTS AND OTHER MATERIALS PERTAINING TO FALL PROTECTION

GENERAL INDUSTRY – OSHA	
Floor and Wall Openings	1910.23
Ladder Safety Devices	1910.27 (d) (5)
*Powered Platforms and Building Maintenance	1910.66
Confined Space	1910.146
CONSTRUCTION – OSHA	
*Fall Protection	1926.500
	(Subpart M)
ANSI STANDARDS	
*Fall Protection	A10.14, Z359.1
Ladder Safety Devices	A14.3
Personnel and Debris Nets	A10.11
Confined Space	Z117.1
CSA STANDARDS	
Safety Belts and Lanyards	Z 259.1
Fall Arresting Devices and Vertical Lifelines	Z 259.2.1
Self-Retracting Devices for Personal Fall Arrest Systems	Z 259.2.2
Lineman's Body Belt and Lineman's Safety Strap	Z 259.3
Full-Body Harnesses	Z 259.10
Shock-Absorbing for Personal Fall Arrest	Z 259.11



*Much of the information contained in this guide is based on regulations and advisements presented in these regulations and standards as of August 1997.

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, 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.

Written Fall Protection Plan

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 it should cover the basics with the essential elements clearly conveyed and understood by all participants of the program.

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.

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 be instructed on inspection and maintenance procedures and the proper wearing of fall protection equipment.

By following all parts of "The Miller[®] Systems Approach" to fall protection, employers can offer maximum protection for their employees. A thorough fall protection program is an effective management tool for providing a safe work environment. In addition, successful implementation of a complete fall protection program can increase worker efficiency and save the company money.

If workers are properly trained and use the right equipment, they should be able to work at maximum efficiency at any height. With a superior protection program in place, workers will be more at ease and better able to perform their job functions. In short, using "The Miller[®] Systems Approach" to fall protection can save lives and makes good business sense.





A comprehensive fall protection program must be viewed as a "total system" beginning with hazard identification and ending with ongoing management review. A Personal Fall Arrest System (PFAS) can be viewed as a "system within a system." Three key components of the PFAS need to be in place and properly used to provide maximum worker protection. FALL PROTECTION PRODUCT GROUPS

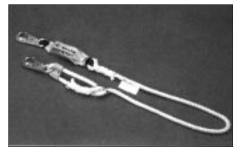
Three system components

Body Wear: The first component is the personal protective gear worn by workers while performing the job. Full-body harnesses are the only appropriate equipment to be worn in the event of a free fall. Harnesses should be selected to meet the needs of the work environment. In some cases, a customized harness may be required.

Connecting Devices: The second system component is the connecting device. This device can be a rope or web lanyard, rope grab or retractable lifeline. However, shockabsorbing lanyards are recommended because they significantly reduce the forces generated in a fall.

Anchorage Point: The final component of the system is the anchor point (often referred to as the tie-off point). This point must be capable of supporting 5,000 pounds per worker, such as a support beam, cross-arm strap or beam trolley.

Individually, none of these components will provide protection from a fall. Used properly with each other, they form a Personal Fall Arrest System which becomes a critically important part of the "total fall protection system."



Adjustable Shock-Absorbing Lanyard



Full-Body Harness



Eye Bolt Attachment



Four Functional Equipment Categories

Fall protection equipment may be divided into four functional categories, which are identified by the following symbols.







3. Suspension



4. Retrieval

1. Fall Arrest

Fall Arrest



As a general rule, it is recommended that a fall arrest system be used any time a working height of 4 feet or more is reached. Working height is defined as the distance from the walking/working surface to a grade or lower level.

A fall arrest system is designed to be passive and will only come into service should a fall occur. The following equipment is recommended as part of a fall arrest system. (Fig.1)

1) Personal Protective Gear: Full-Body Harness

2) Connecting Device: Shock-Absorbing Lanyard

3) Anchorage Point: Anchorage point and anchorage connector must support 5000 pounds.

Positioning



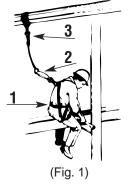
The second category is the personal positioning system, which holds a worker in place while allowing a hands-free work environment. Whenever a worker leans back, the system is activated, making this an "active" system. The following is an example of a widely used positioning system. (Fig. 2)

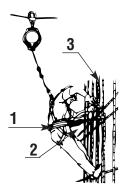
1) Personal Protective Gear: Full-Body Harness

2) Connecting Device: Rebar Chain Assembly

3) Attachment Point: Vertical Rods

Note that a fall arrest system should be used in conjunction with the personal positioning system. A combination system should be used whenever possible, since a personal positioning system is not specifically designed for fall arrest purposes. By using this combination system, the fall arrest components will be activated should the worker suffer a fall.





(Fig. 2)



Suspension

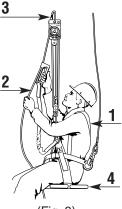


The third category is the personal suspension system. These systems are used widely in the window washing and painting industries, and are designed to lower and support a worker while allowing a hands-free work environment.

The components of a suspension system typically are: (Fig. 3)

- 1) Personal Protective Gear: Full-Body Harness
- 2) Connecting Device: Workline
- 3) Attachment Point: Anchor Bolt/Carabiner
- 4) Positioning Device: Bos'n Chair

Because the suspension system components are not designed to arrest a free fall, a back-up fall arrest system should be used in conjunction with the personal suspension system. This fall arrest system will only activate should the worker experience a free fall.



(Fig. 3)

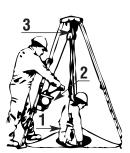
Retrieval



The fourth category of the system is mostly used in confined space, and is known as a personal retrieval system. This system is primarily used where workers must be lowered into tanks, manholes, etc., and may require

retrieval from above should an emergency occur. The following shows a typical personal retrieval system. (Fig. 4)

- 1) Personal Protective Gear: Full-Body Harness
- 2) Connecting Device: Retractable Lifeline/Rescue Unit
- 3) Attachment Point: Tripod



(Fig. 4)





(Fig. 1) Full-Body Harness



(Fig. 2) Sliding Back D-Ring

General Fall Protection Recommendations

The following items are highly recommended to provide maximum protection of workers and ensure compliance with regulations and standards. All work environments are different, so the following are guidelines only. When establishing your own fall protection program, choose the correct Miller[®] system to meet your needs.

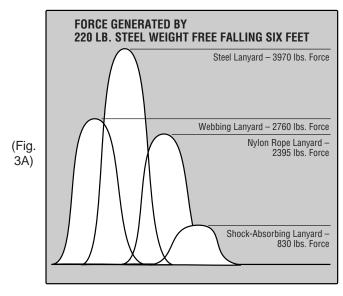
- A. Warnings: Always read all instructions and warnings contained on and in the product packaging before using any fall protection equipment.
- **B. Inspection:** All fall protection equipment should be inspected prior to use by following procedures outlined later in this guide.
- **C. Training:** All workers should be trained by a competent person in the proper use of fall protection products.
- **D. Regulations:** Understand all Federal, State, Local and Provincial regulations pertaining to fall protection before using the equipment.
- E. Rescue Pre-Planning: Minimizing the time between a fall occurrence and medical attention of the workers is vitally important. A thorough rescue program should be established prior to using fall protection equipment. Employers should provide for a prompt rescue should a fall occur. Rescue procedures should be reviewed on a regular basis as part of the company's overall safety training program.
- F. Equipment Preferences: If there are any doubts about which fall protection product to use, choose the following basic system:

1. Full-Body Harness with Sliding Back D-Ring— Should a fall occur, the body harnesses will distribute the load throughout the body (Fig. 1) instead of concentrating the forces on the abdomen, as is the case with traditional body belts. The sliding back D-ring (Fig. 2) will keep the worker in an upright position in the event of a fall, which allows the worker to remain as comfortable as possible while awaiting a rescue.



2. Shock-Absorbing Lanyards with Locking Snap Hooks —

Lanyards with built-in shock absorbers reduce fall arresting forces by 65–80% compared to forces generated by traditional lanyards. (Fig. 3A and 3B)





(Fig. 3B) Manyard[®] Shock-Absorbing Lanyard

Locking snaps feature self-closing, self-locking keepers which remain closed until unlocked and pressed open for connection or disconnection. (Fig. 4) This feature of locking snaps significantly reduces the possibility of accidental disengagement or "rollout." **3. Reliable Anchorage Points** — Anchor points and attachments must be capable of supporting 5000 lbs. per worker. If there is any doubt about the strength of the anchor and/or attachment point — DO NOT ATTACH. Search for an alternative anchor point

and select a proper attachment device. (Fig. 5)

G. Proper Anchor Connecting Procedures: 1. When using a full-body harness, connecting devices should be attached to the D-ring in the middle of back. When using a body belt for restraint, connecting devices should be attached to the D-ring in the back at waist level. Side D-rings or front D-ring

should be used for positioning only, not fall arrest. 2. Always keep free-fall distance to 6 feet or less. If using a six-foot or shorter lanyard, attach at or above the level of your back D-ring.

Workers must also attach to an anchor point in a manner that ensures no lower level is struck during a fall. This is especially important when utilizing shock absorbers as these devices may elongate as much as 3-1/2 feet during the shock-absorption process. A worker of average height utilizing a 6-ft. shockabsorbing lanyard in conjunction with a sliding back D-ring must attach to an anchor point at least 15-1/2 feet from a lower level. If workers must attach at a lesser height, shorter lanyards or alternate forms of connecting devices must be utilized.



(Fig. 4) Locking Snap



(Fig. 5) Anchor Point





Cross-Arm Strap



Compatible Components

PROPER ANCHOR ATTACHMENT PROCEDURE

- 6 ft. Average height of worker
- 6 ft. Lanyard length
- 3-1/2 ft. Maximum shock absorber extension
- 15-1/2 ft. Maximum fall from anchor point

3. Do not connect your cross-arm strap around sharp or rough edges.

- **H. 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.
- I. What to Do After a Fall: If a fall occurs, all components of the fall arrest system should be removed from service.
- J. Call for Information: If there are any questions or concerns about your fall protection program or system, contact the Miller[®] Training Department at 1-800-873-5242.



Fall Protection products are designed for today's rugged work environments. To maintain proper service life and high performance, all products should be inspected frequently. Visual inspection before each use is just common sense. Regular inspection by a competent person for wear, damage or corrosion should be a part of your safety program. Inspect equipment daily and replace it if any of the defective conditions explained in this manual are found.

Harness/Body Belt Inspection

To inspect your harness, perform the following procedures for all harness straps.

1. Webbing

Grasp the webbing with your hands 6 to 8 inches apart. Bend the webbing in an inverted "U" as shown. The surface tension resulting makes damaged fibers or cuts easier to see. Follow this procedure the entire length of the webbing, inspecting both sides of each strap. Watch 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

Attachments of buckles and D-rings should be given special attention. Note any unusual wear, frayed or cut fibers, or distortion of the buckles or D-rings.

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.

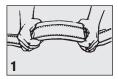
5. Tongue Buckle

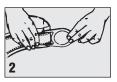
Buckle tongues should be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. Roller should turn freely on frame. Check for distortion or sharp edges.

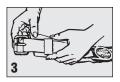
6. Friction and Mating Buckles

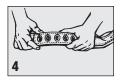
Inspect the buckle for distortion. The outer bars and center bars must be straight. Pay special attention to corners and attachment points of the center bar.

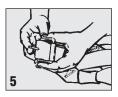
INSPECTION AND MAINTENANCE

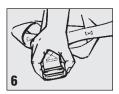












LANYARD INSPECTION

When inspecting lanyards, begin at one end and work to the opposite end. Slowly rotate the lanyard so that the entire circumference is checked. Spliced ends require particular attention. Hardware should be examined under procedures detailed below, i.e., snaps, D-ring and thimbles.

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.

2. Steel Lanyard

While rotating the steel 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. Examine the webbing for swelling, discoloration, cracks, charring are obvious signs of chemical or heat damage. Observe closely for any breaks in the stitching.

4. Rope Lanyard

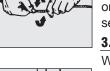
Rotation of the rope lanyard while inspecting from end-toend will bring to light any fuzzy, worn, broken or cut fibers. Weakened areas from extreme loads will appear as a noticeable change in original diameter. The rope diameter should be uniform throughout, following a short break-in-period.

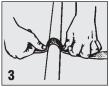
5. Shock Absorber Pack

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.

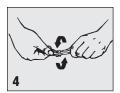




1a

1b

2







Molten Metal Type of Paint and Wébbing Heat Chemical or Flame Solvents Nylon In excessive Change in Webbing strands Paint which Polyester heat. nvlon color usually fuse together. penetrates and DuraFlex™ becomes brittle appearing as a Hard shinv dries restricts and has a brownish smear spots. Hard movement of shriveled brownor smudge. and brittle feel. fibers. Drying ish appearance. Transverse agents and Fibers will break cracks when solvents in when flexed. bent over a some paints Should not be mandrel. Loss cause chemical exposed to temof elasticity. damage. peratures above 180°F (°c).

VISUAL INDICATIONS OF DAMAGE TO WEBBING AND LANYARDS

NOTE: Lanyards made of nylon or polyester rope will show the same visual indications of damage as nylon or polyester webbing.

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 and Polyester

Wipe off 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.



HOW TO WEAR A FULL-BODY HARNESS

All full-body harnesses should be visually inspected before each use by following the inspection procedures outlined in this guide.

Harness styles vary, always refer to the instructions enclosed with your 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.



 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. Waist strap should be tight, but not binding.



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.



Anchor Connector—the act of a user who is wearing personal fall protection equipment, connecting directly or indirectly to an anchorage. It also means the condition of an employee being connected to an anchorage.

Anchorage—a secure point of attachment for lifelines, lanyards, or deceleration device.

Arresting Force—the force transmitted to the body when a fall is arrested.

Body Belt—(safety belt) a strap with means both for securing about the waist and for attaching to a lanyard, lifeline or deceleration device. Used only for positioning and/or restraint in conjunction with a fullbody harness.

Body Harness—a design of straps which is secured about the person in a manner to distribute the arresting forces over at least the thighs, shoulders, and pelvis, with provisions for attaching a lanyard, lifeline, or deceleration device.

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.

Deceleration Device—any mechanism which serves to dissipate energy during a fall.

Deceleration Distance—the additional vertical distance a falling person travels, excluding lifeline elongation, 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 just prior to activation of the deceleration device during a fall, and the location of that attachment point after the person comes to a full stop.

Free Fall—the act of falling, before the personal fall protection system begins to arrest the fall.

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

Hardware—buckles, D-rings, snap hooks and associated hardware which are used to attach the components of a Personal Fall Arrest System together.

GLOSSARY OF EQUIPMENT AND REGULATORY TERMS



Body Belt



Deceleration Device



Hardware



Ladder Safety Device





Rope Grab



Saddle Belt



Self-retracting Lifeline



Shock-Absorbing Lanyard

Ladder Safety Device—a device, other than a cage or well, designed to help prevent accidental falls from ladders, or to limit the length of such falls. A ladder safety device usually consists of a carrier, safety sleeve, and body belt or harness.

Lanyard—means a flexible line used to secure a body belt or body harness to a lifeline or directly to a point of anchorage.

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.

Retractable Lifeline—an automatic tensioning line that pays out and retracts a line at a certain speed and locks or brakes when the speed is exceeded.

Rope Grab—a device which attaches to a lifeline as an anchoring point that provides a means of arresting a fall.

Saddle Belt—a body belt which usually has additional straps for supporting a person in a sitting position at a work station, such as a tree trimmer's saddle.

Safety Sleeve—the moving component with locking mechanism of a ladder safety device which travels on the carrier and connects the carrier to the harness or body belt.

Self-Retracting Lifeline/Lanyard—a deceleration device which contains a drum-wound line which may be slowly extracted from, or retracted onto the drum under slight tension during normal movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

Shock Absorbers—a component of a personal fall arrest system which allows dissipation of energy by extending the deceleration distance reducing fall arrest forces.

Shock-absorbing Lanyard—specially designed shock-absorbing lanyard elongates during a fall to significantly reduce fall arresting forces.

Snap Hook—A self-closing device with a keeper, latch or other similar arrangement which will remain closed until manually opened.

Suspension Belts—simple or compound straps that may be secured about the body as an independent work support. Examples include saddle belts or tree trimmer's belts.

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



Dalloz Fall Protection manufactures the most diverse line of Miller® brand Fall Protection/ Confined Space Equipment and Training Services in the industry. Whether you require a few basic components or a complete fall protection system, Miller® brand products will meet your needs. MILLER® FALL PROTECTION EQUIPMENT AND TRAINING



DuraFlex™ Full-Body Harnesses



Manyard® II Shock-Absorbing Lanyard



MightyLite Self-Retracting Lifelines



SureTrack® Ladder Climbing Systems



Rope Grabs



Confined Space Equipment



Anchorage Connectors



Miller[®] Fall Protection Training Programs

Where to Turn for Advice

Whether your fall protection needs are basic or complex, Dalloz Fall Protection can provide you with assistance. As the industry leader in fall protection technology, DFP has been meeting customers' fall protection needs with quality Miller® products and services since 1944. So whether you are just starting a fall protection program or have questions about the system you now have in place, we welcome the opportunity to serve you, call us at 1-800-873-5242.



Call 800-873-5242 for the Miller[®] distributor nearest you.

Contact your Miller® distributor:



Franklin, PA U.S.A. Toll Free 800-873-5242 Fax 800-892-4078

dalloz fall protection[~]

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