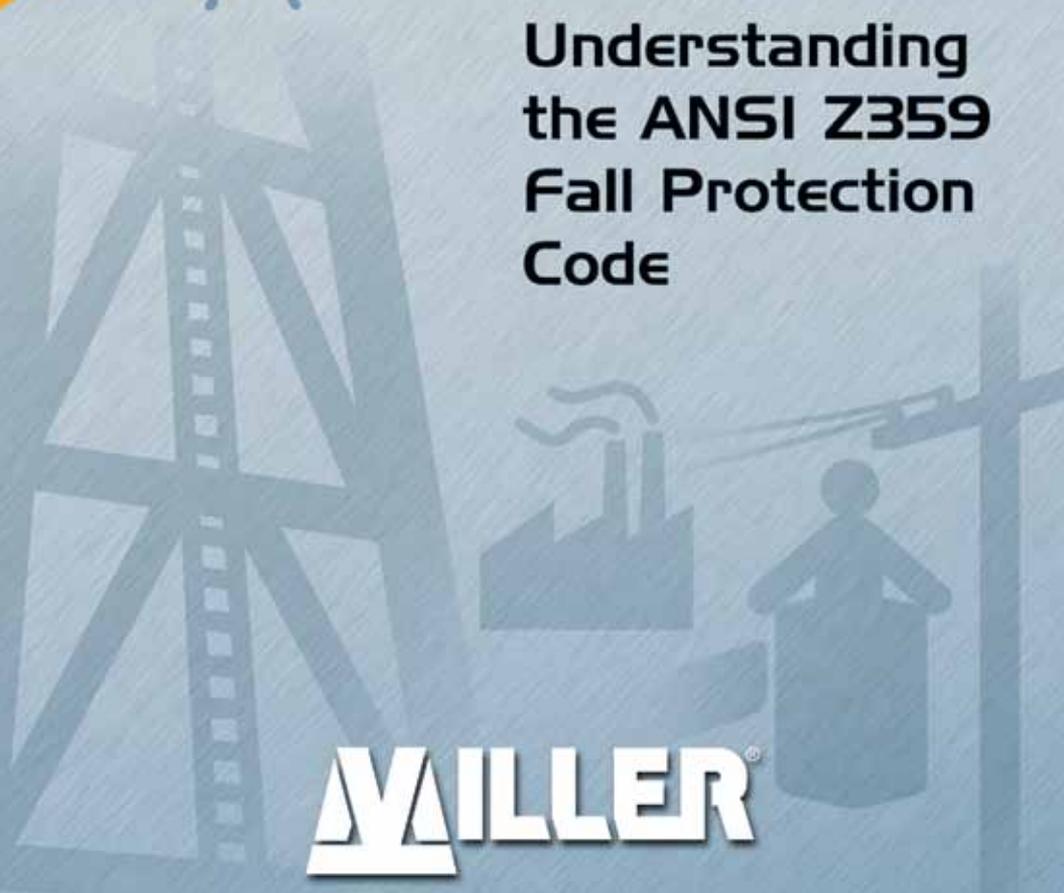


- Z359.0 – Definition and Arrest
- Z359.1 – Safety Requirements for Personal Fall Arrest Subsystems and Components
- Z359.2 – Minimum Requirements for a Comprehensive Fall Protection Program
- Z359.3 – Safety Requirements for Positioning and Travel Restraint Systems
- Z359.4 – Safety Requirements for Assisted Descent Systems

# ANSI Z359

## Understanding the ANSI Z359 Fall Protection Code



**MILLER**<sup>®</sup>

by Honeywell

Updated August 2012

# Understanding the ANSI Z359 Fall Protection Code

## Purpose of Document

This document provides a basic understanding of the ANSI Z359 Fall Protection Code and the key changes that have been incorporated into the Standards. It is intended to provide only the highlights of the Standards. It is not an exhaustive, all inclusive, account of every change in a Standard. A great deal of care was given to the accuracy of the information contained in this document, however, the final source used as a reference should be the actual Standards themselves. For a detailed account of all changes, obtain an official copy of the ANSI Z359 Fall Protection Code from the American Society of Safety Engineers (ASSE) through its web site: [www.asse.org](http://www.asse.org)

Please refer to ANSI/ASSE Z359.0, *Definitions and Nomenclature Used for Fall Protection and Fall Arrest*, for definitions of terms used in this document regarding the Standards.

## Who is ANSI ?

The **American National Standards Institute (ANSI)** coordinates the development and use of *voluntary consensus standards* in the United States. An ANSI Standard implies a consensus of those substantially concerned with its scope and provisions, and is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an ANSI Standard does not in any respect preclude any party from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the Standard.

**It is important to remember that the ANSI Standards do not constitute governing law.** ANSI Standards are subject to periodic review and users are cautioned to always reference the latest editions.

## What is ANSI Z359.1 ?

ANSI Z359.1 “American National Standard Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components” was originally published in 1992 and later revised in 1999 (editorial changes only). The purpose of this Standard was to address the variety of equipment being developed in the rapidly growing field of Fall Protection.

The original Standard included the following equipment: harnesses, lanyards (including self-retracting lanyards), lifelines, energy absorbers, anchorage connectors, fall arresters, and components of such equipment including connectors, rope, straps, thread and thimbles. This Standard applied to fall arrest equipment used in General Industry and non-construction occupations. The Construction Industry has its own set of Standards (ANSI A10.32-2004).

## **Why the changes to the ANSI Standards?**

The original Standards (ANSI Z359.1) published in 1992 and later revised in 1999 were always intended to be the first in a series of Standards to address a full comprehensive fall protection program. While the original Standards only addressed Fall Arrest Systems, equipment used for positioning, travel restraint and rescue, which is quite different, was to be addressed later in the series.

The *ANSI Z359 Fall Protection Code* introduced in 2007 was approved by the *American National Standards Institute* to address fall protection requirements for General Industry. The ANSI Z359 Fall Protection Code is an umbrella for a series of seventeen (17) fall protection-related Standards.

### *Five (5) Standards were approved and became effective Nov. 24, 2007:*

ANSI Z359.0 – 2007	Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ANSI Z359.1 – 2007	Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
ANSI Z359.2 – 2007	Minimum Requirements for a Comprehensive Managed Fall Protection Program
ANSI Z359.3 – 2007	Safety Requirements for Positioning and Travel Restraint Systems
ANSI Z359.4 – 2007	Safety Requirements for Assisted Rescue and Self-Rescue Systems, Subsystems and Components

### *An additional three (3) Standards were approved and became effective Nov. 16, 2009:*

ANSI Z359.6 – 2009	Specifications and Design Requirements for Active Fall Protection Systems
ANSI Z359.12 – 2009	Connecting Components for Personal Fall Arrest Systems
ANSI Z359.13 – 2009	Personal Energy Absorbers and Energy Absorbing Lanyards

### *An additional one (1) Standard was approved and effective Oct. 3, 2011:*

ANSI Z359.7 – 2011	Qualification and Verification Testing of Fall Protection Products Note: Manufacturers have until October 3, 2012 to comply with the testing requirements detailed in the standard. As of October 3, 2012, products marked with ANSI Z359 must meet the minimum requirements of the both the Z359.7 standard and the associated ANSI product standard.
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An additional one (1) Standard is approved and effective August 20, 2012:

ANSI Z359.14 – 2012 Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems

ANSI intends to create 7 additional Standards which are listed below. Work continues on these Standards by various ANSI committees. No effective completion dates have been announced.

<b>ANSI Z359.5</b> Safety Requirements for Personal Fall Arrest Systems	<b>ANSI Z359.8</b> Requirements for Rope Access	<b>ANSI Z359.11</b> Requirements for Full-Body Harness for Personal Fall Arrest System
<b>ANSI Z359.15</b> Safety Requirements for Vertical Lifelines for Personal Fall Arrest Systems	<b>ANSI Z359.16</b> Safety Requirements for Fall Arresters for Personal Fall Arrest Systems	<b>ANSI Z359.17</b> Safety Requirements for Horizontal Lifelines for Personal Fall Arrest Systems
<b>ANSI Z359.18</b> Safety Requirements for Anchorage Connectors for Personal Fall Arrest Systems		

**What are the key significant changes within each of the Standards?**

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**ANSI Z359.0-2007 Definitions and Nomenclature Used for Fall Protection and Fall Arrest**

The ANSI Z359.0 Standard provides terminology and definitions used throughout the family of Z359 Standards. This Standard was created from the original ANSI Z359.1, Section 2. It has been separated out for ease of reference.

# ANSI Z359.1-2007 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

This Standard includes a few key changes and additions:

1. The definition section(s) of the original Standard has been removed. All terminology and definitions are now encompassed in the ANSI Z359.0 Standard.
2. The testing and performance requirement for snap hooks and carabiners has been moved into ANSI Z359.12-2009 (see pages 13-14)
3. All information pertaining to personal energy absorbing lanyards and energy absorbing lanyards has been moved into ANSI Z359.13-2009 (see pages 15-16)
4. Previously, the ANSI Z359.1 Standard only allowed the front D-ring to be used for ladder climbing, fall restraint and positioning. Section 3.2.2.5a allows the front D-ring to be used in a fall arrest system that:
  - (a) Limits the maximum free fall distance to two (2) ft. (0.6m)
  - (b) Limits the maximum arrest force to 900 lbs. (4.0kN).

The Standard also details the strength and performance testing requirements for the front D-ring in Sections 4.3.3.1a and 4.3.3.2a.

Miller Front D-ring Harness



5. Under “Equipment Rigging and Use,” Section 7.2, anchorages used for a Personal Fall Arrest System (PFAS) shall be capable of sustaining static loads in the direction permitted by the PFAS:
  - (a) two times the maximum arrest force permitted by the System when certification exists; or
  - (b) 5,000 lbs. (22.2kN) in the absence of certification. The old Standard required 3,600 lbs. (16.0kN) without certification.

6. To help distinguish new connectors from existing connectors (i.e. snap hooks and carabiners), they shall now be marked as follows:
  - Year of manufacture
  - Manufacturer's identification
  - Part number
  - Load rating for the major axis of the connector stamped or otherwise permanently marked on the device
  - Load rating for gate stamped or otherwise permanently marked on the gate mechanism
  - Markings for connectors shall be sufficient to provide traceability
  - For connectors that are non-integral, include the Standard number "Z359.1 (07)"

## **ANSI Z359.2-2007 Minimum Requirements for a Comprehensive Managed Fall Protection Program**

This Standard requires a formal managed fall protection program for organizations where employees are exposed to fall hazards. This Standard establishes guidelines and requirements for an employer's managed fall protection program including:

1. Policies, Duties and Training
2. Fall Protection Procedures
3. Eliminating and Controlling Fall Hazards
4. Rescue Procedures
5. Incident Investigations
6. Evaluating Program Effectiveness

The reason this Standard was established is defined in the "Purpose" (Section 1.2.1) of the Standard.

Developing and implementing a comprehensive managed fall protection program is the most effective method to:

- Identify, evaluate and eliminate (or control) fall hazards through planning
- Ensure proper training of personnel exposed to fall hazards
- Ensure proper installation and use of fall protection and rescue systems
- Implement safe fall protection and rescue procedures

The Standard in Section 3 establishes clear roles and responsibilities for several key personnel that are instrumental for a well-managed fall protection program. These roles would include the employer, Program Administrator, Qualified Person, *Competent* Person, Authorized Person, *Competent* Rescuer, Authorized Rescuer, Qualified Person Trainer, *Competent* Person Trainer and *Competent* Rescuer Trainer. Please refer to the Standard for complete information concerning roles and responsibilities.

Fall Protection and Rescue Training is addressed in Section 3.3 and references ANSI/ASSE Z490.1 “Criteria for Accepted Practices in Safety, Health and Environmental Training” as the Standard to which these programs must comply.

Section 4 of the Standard addresses the requirement to have written fall protection procedures whenever one or more authorized persons are routinely exposed to any fall hazard. These procedures are written based upon a fall hazard survey required for every workplace activity where authorized persons are exposed to a fall hazard. This survey is intended to identify one or more methods to eliminate or control each identified fall hazard.

Section 5.1 of the Standard details the preferred fall protection hierarchy that shall be used when choosing methods to eliminate or control fall hazards. The preferred hierarchy is as follows:

1. Elimination or Substitution: Remove the hazard
2. Passive Fall Protection: Isolate or separate hazard from workers
3. Fall Restraint: Prevent the person(s) from reaching the fall hazard
4. Fall Arrest: Attach a person to a system designed to stop a fall after it has begun
5. Administrative Controls: Establish work practices or procedures to warn an authorized person to avoid approaching a fall hazard

A detailed set of requirements for anchorage systems is provided in Section 5.4 and outlined below. Also provided in Section 5.4 is the definition of non-certified systems versus certified systems. This has a bearing on the load requirements specified.

## Static Load Requirements

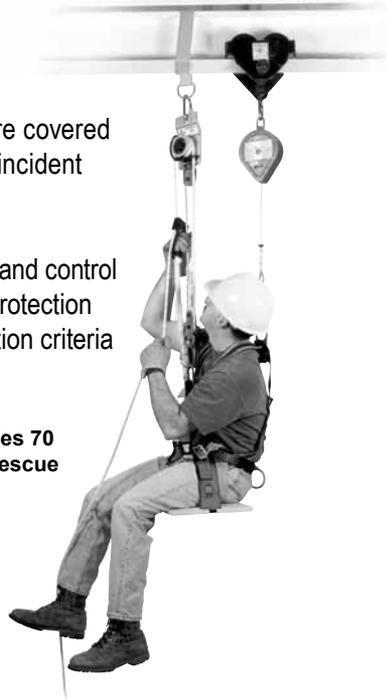
	Non-Certified	Certified
Fall Arrest Systems	5,000 lbs. (22.2 kN)	2 X maximum arresting force
Work Positioning Systems	3,000 lbs. (13.3 kN)	2 X foreseeable force
Restraint & Travel Systems	1,000 lbs. (4.5 kN)	2 X foreseeable force
Rescue Systems	3,000 lbs. (13.3 kN)	5 X applied load
Horizontal Lifelines	Must sustain at least two times the maximum tension developed in the lifeline during fall arrest in the direction applied by lifeline forces	

Inspection, maintenance and storage procedures are covered in Section 5.5 of the Standard. All fall protection equipment and anchorages must be inspected at the beginning of each eight-hour shift by an authorized person and at least once per year (or more frequently if required by manufacturer) by a *competent* person or a *competent* rescuer as appropriate to verify equipment is safe for use.

Written or electronic records of inspection should be kept on file for service life of product.

Additionally, rope access standards and procedures are addressed for the first time in Section 5.6 of the Standard. Rescue procedures are covered in Section 6.0 followed by procedures required for incident investigation in Section 7.

Lastly, a critical component in fall hazard elimination and control is to evaluate the effectiveness of the managed fall protection program. Section 8 of the Standard provides evaluation criteria that shall be used in such evaluations.



**Miller Series 70  
Universal Rescue  
System**

## **ANSI Z359.3-2007 Safety Requirements for Positioning and Travel Restraint Systems**

This Standard provides the minimum guidelines for the system design, manufacture and test of personal work positioning and travel restraint systems. These systems are not to be used as fall arrest systems but shall be supplemented with a secondary fall protection system.

Positioning systems allow the workers to be supported on an elevated vertical or inclined surface such as a wall, and to work with both hands free.

A travel restraint system limits travel in such a manner that the user is not exposed to a fall hazard. Travel restraint systems are only permitted on a walking/working surface with a slope of between 0 and 18.4 degrees.

Rope and webbing used in manufacturing of lanyards shall be of virgin synthetic material and have the strength, aging, abrasion and heat resistance equal to or greater than polyamides.

If chain is used, it must be grade 80 alloy with a minimum nominal chain size of 9/32" (7.1mm). All chain fittings shall meet or exceed breaking strength of chain size selected. Lanyards and harnesses used in positioning systems shall have a minimum breaking strength of 5,000 lbs. (22.2 kN).

All buckles and adjusters must withstand a tensile force of 4,000 lbs. (17.8kN) while all D-rings, O-rings and oval rings must withstand a tensile force of 5,000 lbs. (22.2kN). All snap hooks, carabiners and harnesses must meet the requirements specified in ANSI Z359.1-2007.

## **ANSI Z359.4-2007 Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components**

The purpose of this Standard is to provide requirements for the performance, design, marking, qualification, instruction, training, use, maintenance and removal from service of equipment used in the assisted-rescue and self-rescue systems for one (1) or two (2) persons. This equipment includes connectors, harnesses, lanyards, anchorage connectors, winches/hoists, descent control devices, rope tackle blocks and self-retracting lifelines with integral retrieval capability.

The capacity of the rescue system shall be from 130 lbs. (59kg) to 310 lbs. (140kg) for one (1) person and 130 lbs. (59kg) to 620 lbs. (280kg) for two (2) person systems. All connective hardware used shall comply with the requirements of ANSI Z359.1-2007.

Section 3.2.2 “Body Support Components” details the requirements of the major components used in typical rescue systems.

Full-body harnesses shall meet the requirements of ANSI Z359.1-2007. Unless prohibited by the manufacturer, the dorsal attachment element is suitable for rescue. Any other attachment elements designated for rescue must be statically tested to 3,600 lbs. (16.0kN). Evacuation harnesses shall not be used for fall protection and shall at a minimum provide support for the body during rescue, whether conscious or unconscious.



Rescue lanyards, anchorage connectors and self-retracting lanyards with rescue (RSRL) capability shall all meet the requirements of ANSI Z359.1-2007. In addition, the Standard provides greater detail on the requirements for the RSRL, including:

- Ability to engage in rescue mode at any time and not inadvertently change to and from rescue mode
- Minimum mechanical advantage of 3:1
- Automatically stop and hold the load if the rescuer relinquishes control
- Must have a means to stabilize the device during use in rescue mode
- Devices that use a power source shall have a means to limit applied lifting force and speed and provide a manual back-up means of operation

Synthetic rope tackle block devices defined as, “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” are detailed in Section 3.2.6. Among the highlights of these requirements are:

- Rope must be made of virgin synthetic material and have strength, aging, abrasion and heat resistance characteristics equal to or superior to polyamides and minimum breaking strength of not less than 4,500 lbs. (20.0kN)
- Have a secondary braking means to prevent uncontrolled lowering of load
- Have a minimum mechanical advantage of 3:1

Descent device requirements are defined in Section 3.2.7 and are highlighted below:

- Capacity of 310 lbs. (140kg)
- Descent devices are classified as single use or multiple use. Single-use devices must have a minimum descent energy rating of 30,000 ft./lb. Multiple-use devices must have a minimum descent energy rating of 300,000 ft./lb.
- Descent speeds for automatic descent control devices shall be a maximum of 6.6 feet/second (2.1m/sec.) and a minimum of 1.6 feet/second (5.3m/sec.). Manual descent devices shall not exceed 6.6 feet/second (2.1m/sec.). Hand-operated devices shall not exceed 6.6 feet/second (2.1m/sec.) after the control device is released
- Static load of 2,700 lbs. (12.0kN)
- Rope and webbing must be made of virgin synthetic material and have strength, aging, abrasion and heat-resistance characteristics equal to or superior to polyamides and minimum breaking strength of not less than 3,000 lbs. (13.3kN)
- Wire rope must be stainless steel or galvanized steel strand with the minimum breaking strength of 3,000 lbs. (13.3kN)
- Snap hooks and carabiners shall meet the requirements of ANSI Z359.1-2007

Personnel hoist requirements are detailed in Section 3.2.8, the highlights of which are listed below:

- Capacity of 310 lbs. (140kg) when designed for raising/lowering one person or 620 lbs. (280kg) for two persons. The device shall be identified as to the number of persons for which it is rated.
- The hoist shall permit operation by one person and shall automatically stop and hold the load if the operator relinquishes control
- Hoists with powered operation shall have a means to limit applied lifting/lowering force and speed
- Shall support static load of 3,100 lbs. (13.8kN) applied directly to the point of hoist line attachment to drum
- Maximum force required to raise and lower the load shall be 30 lbs. (13kN). When control is released, the hoist shall stop within 4 in. (10.2cm).
- Hoists shall be equipped with a secondary brake system that engages in the event the primary brake is disabled. This brake must stop the load within 24 in. (61.0cm)
- Snap hooks and carabiners must meet ANSI Z359.1-2007
- Rope and webbing must be made of virgin synthetic material and have strength, aging, abrasion and heat-resistance characteristics equal to or superior to polyamides and minimum breaking strength of not less than 4,500 lbs. (20.0kN)
- Wire rope must be stainless steel or galvanized steel strand with the minimum breaking strength of 3,400 lbs. (15.1kN)

Additionally, the Standard provides detailed qualification testing, marking and instruction requirements.

All equipment must be inspected by the rescuer before each use and by a *competent* person other than the rescuer at intervals of no more than one year. Inspection criteria shall be established by the rescuer's organization and must equal or exceed the manufacturer's instructions. These inspections shall be documented and maintained by the rescuer's organization.

## **ANSI Z359.6-2009 Safety Requirements and Specifications for Personal Fall Arrest Systems**

The ANSI Z359.6-2009 Standard is primarily targeted to engineers with expertise in designing active fall protection systems. Active fall protection systems are defined as:

*“A means of providing fall protection that requires workers to take specific actions, including wearing (and otherwise using) personal fall protection equipment and following prescribed procedures. Examples include travel restraint and fall arrest systems.”*

The Standard specifies requirements for the design and performance of complete, active fall protection systems, including any fall restraint, fall arrest, travel restriction or administrative controls used to protect authorized persons at height.

As with all ANSI Standards, compliance is *voluntary* for an organization and does not supersede current occupational health laws. Detailed engineering calculations are presented in the ANSI Z359.6 Standard, however, the calculations are not addressed in this document. To review the calculations in detail, a copy of the Standard can be purchased from the American Society of Safety Engineers (ASSE).

What the ANSI Z359.6-2009 Standard does not address:

- Fall arrest equipment or systems that have already been manufactured and successfully tested to other ANSI Z359 Standards.
- Passive fall protection systems such as guardrails and safety nets, unless they serve as anchorage systems or sub-systems as part of the active fall protection systems covered by the Standard
- Positioning systems.
- The determination of the structural strength and behavior of components or anchorages of active fall protection systems.

## **ANSI Z359.12-2009 Connecting Components for Personal Fall Arrest Systems (PFAS)**

This Standard establishes the requirements for performance, design, marking, qualification, test methods and removal from service of connectors used in Personal Protective Equipment (PPE). The Standard does not address equipment used in the Construction Industry; window cleaning belts; or sports-related activities. Although horizontal lifelines, climbing systems, man riding, travel restriction, rescue and evacuation systems may incorporate this type of connector, these systems are also outside the scope of this Standard.

Connectors include items such as snap hooks, carabiners, D-rings, O-rings, buckles and adjuster oval rings.

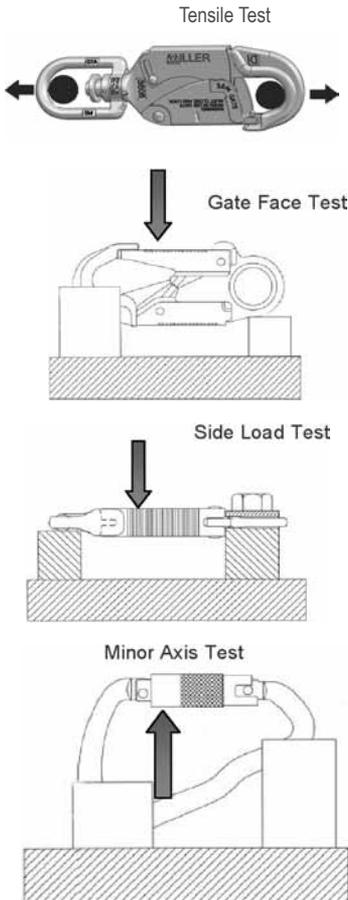
The new ANSI Z359.12 Standard is dedicated solely to connectors that incorporate more detailed and expanded performance and testing requirements. These requirements are based upon many years of testing and research which has provided a better understanding of how this equipment is used.

ANSI Z359.12-2009 essentially extracted the connector requirements from the recently published ANSI Z359.1-2007, whose most significant change involved increasing the connector gate strengths to 3,600 lbs. with the following key additions:

- 1) Pin type captive eye snap hooks or carabiners are no longer excluded from minor axis testing on the connector gate to the 3,600 lb. gate requirement. (Section 3.1.1.4)
- 2) Connectors must now be subjected to a dynamic drop test. When tested, permanent deformation is acceptable, provided that, in cases where the component relies on gate closure, this deformation is not sufficient to release the gate. (Section 3.1.1.8)
- 3) Prior to the dynamic drop testing, the connector must be subjected to a variety of conditioning tests:
  - a. Abrasion Testing: Connector is subjected to 50,000 revolutions with a hexagonal bar to simulate wear. (Section 4.2.3.1)

- b. Cold Conditioning: After abrasion testing, the connector shall be conditioned to -35 +/- 2 deg C for 8 hours before dynamic drop test. (Section 4.2.3.2.1)
- c. Accelerated Weathering: For connectors made of materials other than metal or metal alloys, the test sample shall be subjected for 2,000 hours of specific weathering requirements using xenon arc-lights source prior to dynamic drop testing. (Section 4.2.3.2.2)

The gate hook strength of snap hooks and carabiners significantly changed.  
Section 3.2.1.4



- Tensile loads that a snap hook and carabiner must withstand remain the same as the previous Standard—5,000 lbs. (22.2kN)
  - Gate face strength requirements have changed from 220 lbs. (1kN) (old Standard) to 3,600 lbs. (16kN) (2007 Standard).
  - Side of gate strength requirements have changed from 350 lbs. (1.55kN) (old Standard) to 3,600 lbs. (16kN) (2007 Standard).
  - Minor axis strength of non-captive eye snap hooks or carabiners must be 3,600 lbs. (16kN).
3. Addition of requirements and markings for harnesses with a front-mounted attachment element or “front D-ring” Section 3.2.2.5a.

## **ANSI Z359.13-2009 Personal Energy Absorbers and Energy Absorbing Lanyards**

This Standard establishes requirements for the performance, design, marking, qualification, instructions, inspection, maintenance and removal from service of energy absorbing lanyards and personal energy absorbers for users within the capacity range of 130 to 310 lbs (59-140 kg). The requirements of this Standard do not address the Construction Industry (SIC Division C); window cleaning belts; and sports-related activities. Energy absorbers for horizontal lifelines are not addressed because horizontal lifelines are outside the scope of this section of the Standard.

An energy absorber is defined by ANSI as “A component whose primary function is to dissipate energy and limit deceleration forces imposed on the body during fall arrest.” Energy absorbers could either be pack style or core material inside of the lanyard (tubular-style). Lanyards can be made from any of the following materials: rope, wire rope, or synthetic webbing. Types of energy-absorbing lanyard styles include single-leg lanyards, double-leg or “Y” lanyards and wrap-around or tie-back lanyards.

The most significant changes to the test methods for manufacturers include:

- 1) Increase in the steel test weight from 220 to 282 lbs (100-128 kg)
- 2) Greater elongation of the shock absorber from 42 to a maximum of 48 inches

The ANSI Z359.13-2009 Standard has increased the weight of the steel test mass manufacturers use to test energy-absorbing lanyard performance. ANSI does not exceed OSHA General Industry 1910.66 requirements for shock absorbers, and states when arresting a fall, energy absorbers should limit maximum arresting force on an employee to 1,800 LB. Because the weight has increased, energy absorbers that are part of both pack-style and tubular-style lanyards may deploy with higher fall arrest forces (still under 1,800 LB) and allow for more “elongation” or extension of the energy-absorbing material (maximum 48”).

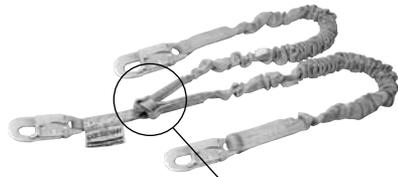
The testing methods were based on accumulated knowledge in the industry of how the products are used, the environments in which they are put to use and also common mistakes in everyday usage. The Z359.13 Standard now offers testing requirements for wrap-around or tie-back lanyards that are a safe solution to the dangerous, but common practice of using a “conventional” energy-absorbing lanyard to tie back onto itself.

The ANSI Z359.13-2009 Standard also addresses six-foot (6') and twelve-foot (12') free falls. It is recommended that alternative means of fall protection be investigated prior to using systems that allow for free falls greater than six (6) feet. The Standard also outlines marking requirements to help users to distinguish between lanyards designed for a six-foot (6') or twelve-foot (12') free fall. Lanyards designed for a six-foot (6') free fall will have labels with black print on a white background. Lanyards designed for a twelve-foot (12') free fall will have labels with white print on a black background.

Addition of double-legged lanyards to the Standard in Section 3.2.3.7a. They are defined as lanyards with two (2) integrally connected legs and shall have a minimum of 5,000 lbs. (22.2kN) breaking strength when statically tested in accordance with 4.3.4.1.3. Double-legged lanyards must also be marked with several warnings pertaining to their use.

These warnings include:

- Connect only the center snap hook to the fall arrest attachment element.
- Do not attach the leg of the lanyard which is not in use to the harness, except to attachment points specifically designated by the manufacturer for this purpose.
- Do not modify the lanyard to create more than a 6 ft. (1.8m) free fall.
- Do not allow the legs of the lanyard to pass under arms, between legs or around the neck.

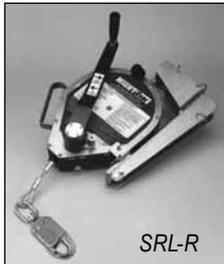


**Miller Double-Legged  
Manyard® II  
Shock-Absorbing  
Lanyard**

# ANSI/ASSE Z359.14 – 2012 Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems

This Standard establishes requirements for the performance, design, qualification testing, markings and instructions, inspections, maintenance and storage, and removal from service of self-retracting devices (SRDs) including:

- Self-retracting lanyards (SRLs)
- Self-retracting lanyards with integral rescue capability (SRL-Rs)
- Self-retracting lanyards for leading edge (SRL-LEs)



Z359.14 establishes requirements for SRDs intended for use in personal fall arrest or rescue systems for authorized persons within the capacity range of 130 to 310 lbs. (59 to 141 kg).

The requirements of this standard supersede any corresponding requirements in either the ANSI/ASSE Z359.1-2007 or ANSI/ASSE Z359.4-2007 American National Standards.

## CLASSIFICATION

A key change is the requirement to classify SRDs as either Class A or Class B based on the results as defined in Section 3.1.9 of the dynamic performance test detailed in Section 4.2.1 and 4.2.2.

**Class A:** Maximum arrest distance of 24 inches (610 mm) and the average arresting force shall not exceed 1,350 lbs. (6 kN) or a maximum peak of 1,800 lbs. (8 kN). After environmental conditioning (Section 4.2.8), the average arresting force is not to exceed 1,575 lbs. (7 kN) or a maximum peak of 1,800 lbs. (8 kN).

**Class B:** Maximum arrest distance of 54 inches (1,372 mm) and the average arresting force shall not exceed 900 lbs. (4 kN) or a maximum peak of 1,800 lbs. (8 kN). After environmental conditioning (Section 4.2.8), the average arresting force is not to exceed 1,125 lbs. (5 kN) or a maximum peak of 1,800 lbs. (8 kN).

## **GENERAL REQUIREMENTS**

Requirements for all SRDs, as well as requirements specific to SRL-Rs and SRL-LEs, are addressed in Section 3 of the Standard. It's important to note that connectors such as snap hooks or carabiners that are integral to SRDs, shall meet the requirements of ANSI/ASSE Z359.12. A visual load indicator shall be included on all SRDs (Section 3.1.4). Also, SRL-LEs, are to include an integral energy absorber element adjacent to the end of the line constituent (synthetic rope/webbing/wire rope) that connects to the body support (Section 3.3.5).

## **QUALIFICATION TESTING**

Notable highlights/additions regarding testing can be found in Section 4 of the Standard and include:

1. The weight requirement of the rigid weight used for dynamic performance testing, increased from 220 lbs. (100 kg) to 282 lbs.(128 kg) +/-2 lbs. (1 kg), Section 4.1.2. This new increased test weight along with a 1:1 conversion factor more closely models the forces of a fully tooled and clothed 310-lb. (141 kg) worker involved in a fall.
2. Environmental conditioning procedures for heat, cold and wet conditions are to be performed on all SRDs with performance and strength testing to be conducted within 90 seconds of completing the conditioning, to mimic actual conditions in the field (Section 4.2.8.1 through 4.2.8.3).
3. Self-retracting lanyards for leading edge testing:
  - The unit's line (webbing/rope/wire) is to be fully extended (maximum of its working range) at the time of the test, to simulate worst-case conditions (Section 4.2.2).
  - Tested in Horizontal Retraction Position as noted in Section 4.2.7.
  - Tested to verify the line will withstand sharp or abrasive leading edges during fall arrest (Section 4.2.2).

## PRODUCT LABELING

The new standard has very specific product labeling requirements to promote a single, uniform graphic system for users to readily identify ANSI-compliant equipment. This is done through a hazard classification system, as well as by using designated colors and safety signal words as detailed in ANSI Z535.

The markings/labeling of equipment must endure for the life of the component being marked and key SRD markings (Section 5.1.3) include:

- Standard number Z359.14
- SRD class
- Average arresting force for the SRD class

In addition to SRD key markings, there are markings specific to SRL-Rs (Section 5.1.4) and SRL-LEs (Section 5.1.5) that include:

- SRL-Rs:**
- Direction to turn crank
  - Warning against allowing slack line while in rescue mode
- SRL-LEs:**
- Minimum installation setback distance
  - Clearance required when falling over edge

## PRODUCT INSTRUCTIONS

Equipment instructions (Section 5.2.2) are also addressed in the standard and highlights include:

- Reference to the Z359 standards and applicable regulations governing occupational safety
- The average arresting force when dynamically tested in accordance with the requirements of this standard
- SRD class and the arrest distance when dynamically tested in accordance with the requirements of this standard
- How to determine fall clearance

Equipment instructions specific to the SRL-LE (Section 5.2.8) include:

- Setback distance
- A warning that anchor point may only be situated at height of edge where fall may occur
- A warning addressing the allowable angle of redirection of lanyard over edge should be at least 90 degrees

## INSPECTION

Equipment inspection (Section 6.1) must be conducted by the user or authorized person prior to each use. Additionally, the Competent Person must inspect equipment at intervals as noted in the chart below.

### Appendix A: Inspection Requirements

Type of use	Application Examples	Conditions of Use	Inspection Frequency Competent Person	Factory Authorized Inspection
Infrequent to Light	Rescue and confined space, factory maintenance	Good storage conditions, indoor or infrequent outdoor use, room temperature, clean environments	Annually	At least every 2-5 years, but not longer than intervals required by the manufacturer
Moderate to Heavy	Transportation, residential construction, utilities, warehouse	Fair storage conditions, indoor and extended outdoor use, all temperatures, clean or dusty environments	Semi-annually to annually	At least every 1-2 years, but not longer than intervals required by the manufacturer
Severe to Continuous	Commercial construction, oil and gas, mining	Harsh storage conditions, prolonged or continuous outdoor use, all temperatures, dirty environment	Quarterly to semi-annually	At least annually, but not longer than intervals required by the manufacturer

## References

- 1) ANSI Z359.0 – 2007 Definitions and Nomenclature Used for Fall Protection and Fall Arrest (Draft), American National Standard, American Society of Safety Engineers, Des Plaines, Illinois, 2007
- 2) ANSI Z359.1 – 2007 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components (Draft), American National Standard, American Society of Safety Engineers, Des Plaines, Illinois, 2007
- 3) ANSI Z359.2 – 2007 Minimum Requirements for a Comprehensive Managed Fall Protection Program (Draft), American National Standard, American Society of Safety Engineers, Des Plaines, Illinois, 2007
- 4) ANSI Z359.3 – 2007 Safety Requirements for Positioning and Travel Restraint Systems (Draft), American National Standard, American Society of Safety Engineers, Des Plaines, Illinois, 2007
- 5) ANSI Z359.4 – 2007 Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components (Draft), American National Standard, American Society of Safety Engineers, Des Plaines, Illinois, 2007
- 6) ANSI Z359.6 – 2009 Specifications and Design Requirements for Active Fall Protection Systems (Draft), American National Standard, American Society of Safety Engineers, Des Plaines, Illinois, 2009
- 7) ANSI Z359.12 – 2009 Connecting Components for Personal Fall Arrest Systems (Draft), American National Standard, American Society of Safety Engineers, Des Plaines, Illinois, 2009
- 8) ANSI Z359.13 – 2009 Personal Energy Absorbers and Energy Absorbing Lanyards (Draft), American National Standard, American Society of Safety Engineers, Des Plaines, Illinois, 2009
- 9) ANSI Z359.14 – 2012 Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems (Draft), American National Standard, American Society of Safety Engineers, Des Plaines, Illinois, 2012

## Conclusion

Protecting workers at heights requires a holistic approach that extends beyond standards and regulations. Meeting new or established standards for safety requirements and product performance provides a starting point for safety on the job site. The initial introduction of the ANSI Z359 Fall Protection Code in 2007 provides requirements to minimize serious injuries often caused by misuse, poor product selection, inadequate training or possibly damaged/worn equipment.

**Miller T.I.P.S.™ for Total Compliance** addresses other important considerations to assure a safe environment when working at heights.



### TRAINING

**Professional Fall Protection Training** – Key to worker safety, on-site awareness, and proper selection and use of fall protection equipment.



### INSPECTION

**Equipment Inspection & Maintenance** – Failure is not an option – when in doubt, throw it out!



### PRODUCTS

**Proper Product Selection & Use** – All work environments differ, use the right equipment for the job!



### STANDARDS

**Addressing the ANSI Z359 Fall Protection Code** – Meeting industry standards indicates that products pass accepted testing procedures.

Globally, Honeywell Safety Products is committed to providing added-value Miller brand fall protection products and services to those specifying, selecting and using our equipment. While safety at heights is our ultimate goal, enhancing worker comfort, trust and increased productivity are also qualities that products bearing the Miller name have strived to maximize for over 60 years.

The Miller brand name is more than a line of quality products. The name represents greater added-value services and expertise that only the leader in fall protection and safety at height can provide.



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