ANSI/ASSE **Z359.14-2012**

"Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems"

MSA The Safety Company

Part of the Fall Protection Code

Introduction

This paper summarizes the new ANSI/ASSE Z359.14-2012 standard. MSA participated in the development of this standard and provides this information as a service to customers and safety professionals. For further information on MSA products that comply with this standard, contact your MSA distributor or MSA Customer Service at 1-800-MSA-2222, or online at www.MSAsafety.com.

SCOPE

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), and self-retracting lanyards with leading-edge capability (SRL-LEs). It also establishes the requirements for self-retracting devices intended for use in personal fall arrest or rescue systems for authorized persons within the capacity range of 130 to 310 pounds.

PURPOSE AND APPLICATION

This standard addresses self-retracting devices used in occupations requiring personal protection against falls from heights.

SELF-RETRACTING DEVICE CLASSIFICATIONS

Self-retracting devices are classified according to dynamic performance. Class A devices have a maximum arrest distance of 24 inches; Class B devices have a maximum arrest distance of 54 inches.

General Requirements

INTEGRAL CONNECTORS

Snaphooks or carabiners which are integral to self-retracting devices must meet the requirements of ANSI/ASSE Z359.12. Integral rings or similar openings intended to accept a snaphook or carabiner should be designed to minimize the possibility of rollout of a mating snaphook or carabiner.

LOCKING FUNCTION

Self-retracting devices must be automatic in their locking (fall stopping) function.

It must not be possible to override the self-locking feature of the device when it is in use. The design, location and protection of working parts must prevent the possibility of performance impairment by casual interference.

VISUAL INDICATOR

Self-retracting devices must include a visual indicator that will activate in a fall event.

CORROSION PROTECTION

All parts of self-retracting devices must have corrosion protection that does not impact operation.

RETRACTION TENSION

The retraction tension of the self-retracting device line should be between 1.25 and 25 pounds at all points in the range of motion.

DYNAMIC PERFORMANCE OF SRL-LEs

For Class A devices:

When tested according to 4.2.2:

- The arrest distance must not exceed 24 inches and the average arresting force must not exceed 1,350 pounds, or a maximum peak of 1,800 pounds.

When tested according to 4.2.8:

- The average arresting force must not exceed 1,575 pounds, or a maximum peak of 1,800 pounds.

For Class B devices:

When tested according to 4.2.2:

- The arrest distance must not exceed 54 inches and the average arresting force must not exceed 900 pounds, or a maximum peak of 1,800 pounds.

When tested according to 4.2.8:

- The average arresting force must not exceed 1,125 pounds, or a maximum peak of 1,800 pounds.

Specific Requirements for Self-Retracting Lanyards with Integral Rescue Capability

OPERATION

The SRL-R:

- Should be able to be engaged into its rescue mode of operation at any time, subject to manufacturer's instructions.
- Should not be able to be inadvertently changed to or from rescue mode.
- Must be capable of raising or lowering the load to affect rescue. The minimum mechanical advantage offered by the SRL-R in rescue mode should be 3:1, neglecting frictional losses. When in rescue mode, the SRL-R device must automatically stop and hold the load if the rescuer intentionally or unintentionally relinquishes control.

LINE CONSTITUENT OF SELF-RETRACTING DEVICES

Both synthetic rope and webbing must be made of pure or non-recycled synthetic materials having strength, aging, abrasion resistance and heat resistance characteristics equivalent or superior to polyamides. Any restrictions on the use of such SRDs are to be marked on the SRD. When statically tested in accordance with references in Sections 7.1, 7.2 or 7.3 as appropriate, both materials must have a minimum breaking strength of 4,500 pounds.

Wire rope must be constructed of stainless steel or galvanized steel strand having a minimum breaking strength of 3,400 pounds when tested in accordance with the reference in Section 7.5, and a minimum nominal diameter of 0.1875 inches.

SRL-LE ENERGY ABSORBER

The line constituent of SRL-LEs must include an integral energy absorber element adjacent to the end of the line which connects to the body support. The energy absorber should meet the requirements of ANSI/ASSE Z359.13. If the SRL-LE device housing is intended to be connected to the body support and can only be used in this orientation, then an energy absorber is not required.

SUBSYSTEM REQUIREMENTS

Subsystems comprised of independent components which meet the requirements of the applicable Z359 standards will be considered in compliance provided that:

- the user strictly adheres to ANSI/ASSE Z359.2, and
- the system meets the performance requirements of the applicable Z359 standards.

Integral subsystems must meet all the requirements of the applicable component standards.

Qualification Testing

TEST EQUIPMENT AND TEST SPECIMENS

The test weight for dynamic performance testing must:

- be rigidly constructed, and
- weigh 282 pounds (+/- 2 lbs)

The test weight for dynamic strength testing must:

- be rigidly constructed, and
- weigh 300 pounds (+/- 2 lbs)

CALCULATING AVERAGE FORCE

For dynamic performance and conditioning tests, the average force will now be used, rather than peak force as in the previous ANSI Z359.1 standard.

To calculate the average force, average every data point over 500 pounds during the arrest period of the self-retracting device on the force/time graph. Then divide the sum of the force data points above 500 pounds by the total number of samples above 500 pounds.

LEADING EDGE MATERIAL

For dynamic testing of SRL-LE devices, the material used for the edge test must be 3/8 x 3 inch or larger sized 1018 cold finished steel bar in accordance with ASTM A108.

SELF-RETRACTING LANYARD QUALIFICATION TESTING

Dynamic Strength Testing of SRL-LE, Edge Test

- Test weight shall be 300 pounds
- Post-fall static test is not required

SELF-RETRACTING LANYARD WITH INTEGRAL RESCUE CAPABILITY (SRL-R) QUALIFICATION TESTING

The Standard details qualification testing for the following:

- SRL-R function testing
- Powered-operation SRL-R function testing
- SRL-R static-strength testing
- SRL-R rescue, post-fall-arrest testing

Markings and Instructions

MARKING REQUIREMENTS

Warnings must be in English and meet the formatting requirements of Section 7.7. Non-warning markings must be in either English or pictorial format. The legibility and attachment of the markings should endure for the life of the component, subsystem or system. Pressure-sensitive labels must comply with the applicable provision of Section 7.6.

SELF-RETRACTING DEVICES

Self-retracting devices must be marked to identify:

- part number and model designation
- year of manufacture
- manufacturer's name or logo
- capacity range
- unique ID number
- standard number (Z359.14)
- how to inspect visual indicator
- the fiber or other materials used in the lanyard construction
- the lanyard working length
- average arresting force for the SRD class
- arrest distance
- proper installation means
- SRD class
- free fall limit
- suitability for use with horizontal lifelines
- suitability for horizontal use
- the following warnings:
  - to follow the manufacturer's instructions included with the equipment
  - to perform regular inspection in accordance with the manufacturer's instructions
  - to avoid lanyard contact with sharp edges and abrasive surfaces (not required for leading edge type SRDs)
  - to test the device for locking and retraction before each use

Self-retracting lanyards with integral rescue capability shall be marked to identify:

- direction to turn crank
- warning against allowing slack line while in rescue mode

Self-retracting lanyards with integral leading edge capability shall be marked to identify:

- minimum installation setback distance
- clearance required when falling over edge

INSTRUCTION REQUIREMENTS

Instructions must be printed in English and affixed to the equipment or included in the packaging at the time of shipment from the manufacturer.

Instructions must contain the following information:

- a statement that the manufacturer's instructions shall be provided to users
- manufacturer's name, address and telephone number

- manufacturer's part number or model designation for the equipment
- intended use and purpose of the equipment
- proper method of use and limitations on use of the equipment
- illustrations showing locations of markings on the equipment
- reproduction of printed information on all markings
- inspection procedures required to assure the equipment is in serviceable condition and operating correctly
- anchorage requirements
- criteria for discarding equipment that fails inspection
- procedures for cleaning, maintenance and storage
- reference to the Z359 standards and applicable regulations governing occupational safety
- proper installation means and limitations on the type of anchorage connectors used, if any
- the diameter of rope or wire rope, and width and thickness of webbing used in the lanyard
- the fiber or other materials used in the lanyard construction
- the lanyard length
- 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
- testing of the device for locking before each use

Instructions must require that:

- only the equipment manufacturer, or persons or entities authorized in writing by the manufacturer, may make repairs to equipment
- the user remove the equipment from field service if it has been subjected to the forces of arresting a fall or affecting a rescue
- the user have a written rescue plan and the means at hand to implement it when using the equipment

Instructions shall provide warnings regarding:

- altering the equipment
- misusing the equipment
- using combinations of components or sub-systems, or both, which may affect or interfere with the safe functioning of each other
- exposing the equipment to chemicals, high heat, severe cold or other harsh environments which may produce a harmful effect and to consult the manufacturer in cases of doubt
- using the equipment around moving machinery and electrical hazards
- using the equipment near sharp edges and abrasive surfaces
- the risk of striking an object or obstruction during a swing fall
- the consequences of improperly using the device or not following instructions or markings, which may cause serious injury or death

SELF-RETRACTING LANYARDS WITH INTEGRAL RESCUE CAPABILITY

Self-retracting lanyards with integral rescue capability shall include:

- capacity when used for rescue, one or two persons
- force required to operate rescue features when device is loaded to capacity
- appropriate methods to receive the individual when retrieved to upper elevation
- warning to prevent slack line while in rescue mode
- maximum input RPM if equipped for powered operation

SELF-RETRACTING LANYARDS WITH INTEGRAL LEADING EDGE CAPABILITY

Instructions for self-retracting lanyards with integral leading edge capability shall include:

- advice that the SRL-LE was successfully tested for horizontal use and falls over a steel edge without burrs. And as a result, the device may be used in situations where a fall may occur over similar edges, such as found on steel shapes or metal sheeting.
- any limitations to the allowable work area relative to the anchorage point, including factors such as swing fall and abrasion on the line at the edge, and the use of a single anchor point versus anchors that allow horizontal movement such as a horizontal lifeline or rail
- indication whether the SRL-LE may be used in combination with a horizontal lifeline or rail
- a warning not to work on the far side of an opening, opposite the SRL-LE anchorage point
- advice that in the event of a fall over the edge, special rescue measures may be required
- setback distance
- the following warnings:
- that the allowable angle of redirection of the lanyard portion of the device at the edge over which a fall might occur (measured between the two sides formed by the redirected lanyard) shall be at least 90 degrees
- that the anchor point may only be situated at the same height as the edge at which a fall might occur or above the edge

User Inspection, Maintenance and Storage of Equipment

The authorized person or rescuer using this equipment shall, at a minimum, comply with manufacturer's instructions regarding the inspection, maintenance, storage and removal from service of the equipment. The program administrator shall retain the manufacturer's instructions and make them readily available to all users.

INSPECTION

Equipment must be inspected by the authorized person or rescuer before each use. Additionally, inspections shall be conducted by a competent person other than the user, and by a factory authorized inspection entity. The competent person should use Appendix A to determine appropriate inspection intervals.

Inspection criteria for the equipment should be set by the program administrator. This criteria must equal or exceed the most restrictive of the criteria established by this standard or the manufacturer's instructions. Inspection criteria should be kept current in relationship to changing patterns or conditions of use.

Documentation of equipment inspections must be maintained by the program administrator. This documentation shall include, at a minimum, the identity of the equipment, inspection date, name of the competent person conducting the inspection and the results of that inspection.

The equipment must be permanently removed from service or undergo corrective maintenance in accordance with the manufacturer's recommendations before return to service, when an inspection reveals one or more of the following:

- defects in equipment
- damage to equipment
- inadequate maintenance of equipment
- activated stress indicators
- activated warning systems or devices

In addition to the inspection requirements of the manufacturer's instructions, the equipment should be inspected for:

- absence or illegibility of markings or tags
- absence of any elements affecting the equipment form, fit or function
- evidence of defects in or damage to hardware elements including cracks, sharp edges, deformation, corrosion, chemical attack, excessive heating, alteration and excessive wear
- evidence of defects in or damage to straps, wire rope, or ropes including fraying, crushing, unsplicing, unlaying, kinking, knotting, roping, broken or pulled stitches, broken or pulled wires or multiple broken wires, excessive elongation, chemical attack, excessive soiling, abrasion, alteration, needed or excessive lubrication, excessive aging and excessive wear
- alteration, absence of parts, or evidence of defects in, damage to or improper function of mechanical devices and connectors
- any other condition that calls into question the suitability of the equipment for its intended purpose

If the equipment has arrested a fall, the equipment must be removed from service, marked or tagged "UNUSABLE" and either disposed of or serviced in accordance with the manufacturer's recommendation.

MAINTENANCE AND STORAGE

Equipment maintenance and storage should be conducted by the user's organization in accordance with the manufacturer's instructions. Unique issues, which may arise due to conditions of use, should be addressed with the manufacturer. Keep manufacturer instructions for reference. Equipment that needs maintenance must be tagged "UNUSABLE" and removed from service.

Equipment should be stored in a manner that protects it from damage due to environmental factors such as heat, light, excessive moisture, oil, chemicals and vapors, or other damaging elements. Store rescue equipment in a clearly marked area that is readily accessible for rescue purposes.

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 environment	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

ID 2300-006-MC / November 2012

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