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How the New Z359 Standards Influence a Maturing Fall Protection Industry

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Introduction

OSHA regulations for the fall protection industry are often vague and open to interpretation, pointing to a need for greater transparency of safety guidelines to better protect workers at heights. For years the ANSI/ASSE Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components, was the lone industry standard designed to address this deficiency. That all changed in 2007 when the document underwent a major overhaul and became the ANSI/ASSE Z359 Fall Protection Code we know today.

Since its launch in November of 2007, the Fall Protection Code has transformed the industry. The Code now provides guidance and clarity to fall protection equipment manufacturers, program administrators, trainers, rescue personnel, end users and engineers alike, supplementing state and federal regulations for fall protection. With the addition of three new standards in 2009 and more on the way, the Code continues to affect change in a rapidly growing market.

There are currently eight individually numbered standards within the Code with three more near completion: ANSI/ASSE Z359.7-20xx, Qualification and Verification Testing of Fall Protection Products; ANSI Z359.11-20xx, Safety Requirements for Full Body Harnesses for Personal Fall Arrest Systems (PFAS); and ANSI/ASSE Z359.14-20xx, Safety Requirements for Self-Retracting Devices for Personal Fall Arrest Systems (PFAS). These standards are expected to be released in 2011.

History of the Fall Protection Code

The ANSI/ASSE Z359 Fall Protection Code is a living document that evolved from ANSI/ASSE Z359.1, a single standard that was adopted in 1992 and addressed elements of a personal fall arrest system. The ANSI/ASSE Z359.1-1992 standard was a mere 100 pages and it remained virtually unchanged before it was reinstated in 1999 and then revised and expanded to become the Fall Protection Code.

In 2007, the Code was released when four new standards were adopted. The scope of the four new standards reached beyond personal fall arrests systems, components and subcomponents to address the minimum requirements of a comprehensive managed fall protection program. It also

covered safety requirements for positioning and travel restraint systems and safety requirements for rescue systems and components.

In November of 2009, the Code grew again with the addition of three new standards. The first of these new standards was intended for professional engineers with expertise designing fall protection systems and it specified design and performance requirements of complete active fall protection systems. The two other standards established detailed requirements for the performance, design, marking qualification, test methods and removal from service of connecting components and personal energy absorbers and energy absorbing lanyards.

- ANSI/ASSE Z359.6-2009 Safety Requirements & Specifications for Personal Fall Arrest Systems (PFAS)
- ANSI/ASSE Z359.12-2009 Safety Requirements for Connecting Components for Personal Fall Arrest Systems (PFAS)
- ANSI/ASSE Z359.13-2009 Safety Requirements for Lanyards & Energy Absorbers for Personal Fall Arrest Systems (PFAS)

Z359.6 provides direction for engineers with expertise in designing fall protection systems (ANSI 2009). Before the release of this standard, there was little direction or assistance for engineers designing fall arrest systems. Systems were designed with varying clearance calculations, using different margins of safety and test weights.

If an employer had a fall hazard that required modifications to existing structure, certification of an anchorage or implementation of a horizontal lifeline; engineers were on their own to calculate loads, apply margins of safety, and determine what documentation, if any, should be supplied with the system.

Unlike Z359.12 and Z359.13, this standard did not apply to commercially available equipment produced under another standard within the Fall Protection Code, but to individually designed systems for routine use. This had a tremendous impact within the fall protection community. Z359.6 standardized equations, clearances, margins of safety, and specified documentation requirements to the design of fall protections systems where previously there were none. Now employers who hired engineering services externally or employed engineers in-house to design fall arrest systems had a design standard for how that should be done.

Z359.12 further addressed connecting components used for personal fall arrest systems. Compatibility of connecting components is commonly misunderstood among end users and remains one of the main issues with fall arrest systems today.

In 2007, the ANSI Z359.1 standard was revised, requiring that connecting components have a minimum gate strength of 3,600 pounds for both nose and side-loading tests. This was a monumental increase. Prior to this, the gates of connectors were only required to withstand loads of 220 pounds on the nose and 350 pounds on the side and would often fail when connected to an incompatible anchorage, despite being self-closing and self-locking. Although many of the failed connections could be categorized as misuse, the technology and processes were created to provide increased gate strength in an attempt to decrease the potential for gate failure. ANSI Z359.12 carried over requirements for increased gate strengths as well as testing and marking requirements for all connectors used in fall arrest systems (See Exhibit 1).

Exhibit 1. Examples of connectors designed in accordance with ANSI Z359.12 are shown above.

The latest addition to the Code is Z359.13 for personal energy absorbers and energy-absorbing lanyards. This standard has significant implications to the design and testing of every personal energy absorber on the market.

Safety requirements for energy absorbers and lanyards had not undergone any substantive changes since 1992. During the years that followed, a number of different energy absorbers and lanyards were introduced that did not have any specific testing or design requirements. Lanyards with two legs (shown in Exhibit 2), energy absorbers designed for twelve-foot free falls, and lanyards that could be wrapped around structure, eliminating the need for an anchorage connector, are some examples of these new products being used nationwide without any design and testing requirements specific to their use.

Exhibit 2. Prior to 2007, lanyards with two legs, like the one shown above, had no unique test requirements.

Without a specific standard to test to, equipment manufacturers would test these products to the best of their ability and label them according to the most applicable ANSI standard, but many times these tests were conducted and/or or interpreted differently from one manufacturer to the next.

Another industry advancement of Z359.13 is the introduction of a new test weight. This may not sound like a big deal for the industry, but it affects virtually every single product that undergoes performance testing.

The ANSI Z359 Accredited Standards Committee (ASC) sets out a maximum capacity of 310 pounds (140 kg). Capacity refers to the weight a component, system or subsystem is designed to hold (ANSI 2007).

For years the industry standard test weight was 220 pounds. During dynamic performance testing of personal fall arrest equipment, manufacturers used a multiplier of 1.4 to relate a steel weight to the human body, which was assumed to absorb some of the acquired energy. Tests conducted by Gravitec Systems, Inc., and others have shown that a multiplier of 1.1 may be more accurate for systems utilizing a full body harness (Gravitec Systems, Inc., 2007).

ANSI has recognized these findings and since adopted the 1.1 conversion factor. When the 220-pound test weight is multiplied by the new conversion factor of 1.1, the result is 242 pounds. To meet the 310-pound standard capacity, new ANSI standards prescribe the use of a 282-pound test weight. This translates to more rigorous qualification testing for personal energy absorbers.

The next standard in the highly anticipated series is ANSI/ASSE Z359.7-20xx, Qualification and Verification Testing of Fall Protection Products, which has been recently balloted and approved.

End users are often shocked to learn that a certification body for fall protection equipment does not exist. Currently, manufacturers are responsible for testing their products to ensure they are compliant with the respective ANSI standard before marking their products with the ANSI number. Many manufacturers are diligent about testing to make sure their products comply,

others are not. This creates a buyer-beware market where consumers cannot be sure which products bearing an ANSI number are truly compliant. The ANSI/ASSE Z359.7 standard will change this.

The new standard will require that both manufacturer labs and third-party labs be an ISO 17025 accredited testing laboratory. Laboratories must also be knowledgeable about fall protection and the equipment they are testing. The standard will require that laboratories conform to requirements for testing structures and equipment and document a Quality Control Plan to ensure product quality over time. Laboratories must also keep design, performance and testing documentation and perform verification testing every two years.

Another standard that is very close to release is ANSI/ASSE Z359.14-20xx, Safety Requirements for Self-Retracting Devices for Personal Fall Arrest Systems (PFAS). Like energy-absorbing lanyards, this standard has remained unchanged since the 90's. There have been several improvements to self-retracting devices as well as new products that have not been addressed by the old standard. ANSI Z359.14 creates classifications that mirror OSHA strength requirements to those devices that lock within and greater than 2'. Other advancements include design and testing requirements for self-retracting devices that include retrieval options as well as devices that are designed to anchor at foot level for unprotected or leading edge work.

Anchoring a self-retracting device at foot level to protect against fall over an edge has historically been frowned upon. This arrangement creates a situation with increased fall distance, higher energy potential, swing fall, and impacts the devices line over and edge. Several products have been created or modified over the years to address this hazard, but there has not been any accepted design or testing practices, leading to varying quality of devices and increased confusion on the part of the employer or end user. Z359.14 works to prevent this by including design, testing, and labeling requirements of self-retracting devices for leading edge work. Combine requirements of this standard with the laboratory and test requirements in Z359.7 and the industry will have improved quality of devices and confidence in fall protection equipment designed and tested according to the Fall Protection Code.

Conclusion

When the Code is complete, a separate standard will exist for every component of a personal fall arrest system including full body harnesses, self-retracting devices, vertical lifelines, fall arresters, horizontal lifelines and anchorage connectors. These standards will replace the content of ANSI/ASSE Z359.1-2007. Standards that are currently under development are:

- ANSI/ASSE Z359.8-20xx Safe Practices for Rope Access Work
- ANSI/ASSE Z359.9-20xx Personal Equipment for Protection Against Falls - Descending Devices
- ANSI/ASSE Z359.11-20xx Safety Requirements for Full-Body Harnesses for Personal Fall Arrest Systems (PFAS)
- ANSI/ASSE Z359.14-20xx Safety Requirements for Self-Retracting Devices for Personal Fall Arrest Systems (PFAS)
- ANSI/ASSE Z359.15-20xx Safety Requirements for Vertical Lifelines for Personal Fall Arrest Systems (PFAS)

- ANSI/ASSE Z359.16-20xx Safety Requirements for Fall Arresters for Personal Fall Arrest Systems (PFAS)
- ANSI/ASSE Z359.17-20xx Safety Requirements for Horizontal Lifelines for Personal Fall Arrest Systems (PFAS)
- ANSI/ASSE Z359.18-20xx Safety Requirements for Anchorage Connectors for Personal Fall Arrest Systems (PFAS)

As the fall protection industry matures, the Fall Protection Code will mature with it. The Code is designed to be able to keep pace with new technology and ultimately provide workers at height with confidence in their fall protection equipment. A product marked under the Fall Protection Code indicates a level of quality and security that employers and workers at heights can be comfortable with.

Bibliography

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