

# AMERICAN NATIONAL STANDARD

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## ANSI/ASSE Z359.1-1992 (R1999) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

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Historical Document—Part of the Fall Protection Code

VERSION **3**



AMERICAN SOCIETY OF  
SAFETY ENGINEERS



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**ANSI®**  
**Z359.1-1992 (R1999)**

**American National Standard  
Safety Requirements for  
Personal Fall Arrest Systems,  
Subsystems and Components**

Secretariat

**American Society of Safety Engineers**

Approved May 6, 1999

**American National Standards Institute, Inc.**

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## Foreword

(This Foreword is not a part of American National Standard Z359.1-1992 (R1999).)

This is a reaffirmation of the 1992 edition of the American National Standard Z359.1 on Fall Protection with no change in technical content. Corrections to typographical errors noted since 1992 have been included in this edition.

The charter and standing of the American National Standards Z359 Committee on Standards for Fall Protection was accredited by the American National Standards Institute (ANSI) on January 6, 1988. The need for this standards activity grew out of several pre-existing conditions. Between 1970 and 1980 fall protection equipment and methods advanced beyond the teachings of American standards and Government regulations published up to that time. That trend continued through the 1980's. Reform of fall protection standards in industrialized nations throughout the world and drafting of a new international standard got under way early in the 1980's. In 1983, when the USA joined the International Organization for Standardization (ISO) effort on fall protection, there were no USA standards for much of the equipment and methods in commonplace industrial use. Further, the pertinent construction industry standards were due for revision. There were a few specialized standards which addressed specific industries or specific equipment and techniques. However, there were no broadly applicable USA standards for occupational or non-occupational fall protection. A task force of the ANSI Safety & Health Standards Board recommended formation of a free standing committee to address the subject of fall protection. The United States Technical Advisory Group (USTAG), which represents the USA fall protection interests to ISO, acted upon the Safety and Health Standards Board recommendation and initiated formation of the Z359 Committee. The American Society of Safety Engineers assumed the Secretariat.

Historically, the notions of user *positioning*, *fall prevention* (restraint) and *fall arrest* have been co-mingled in the literature and not set apart as to their distinguishing characteristics. However, the requirements imposed on personal fall arrest equipment and procedures differ markedly from those essential to positioning and restraint. For example, fall arrest systems are generally on standby in a passive mode until onset of a fall. At that time they must activate and control the dynamic shock loads and deceleration distance for a fraction of a second and then hold the user in suspension until rescued. By contrast, positioning and restraint equipment is in the active mode most of the time to facilitate the user's work and deals only with relatively low static loads. Further, the requirements on equipment and procedures for rescue and evacuation differ from those for positioning, restraint and fall arrest. In general, a fall arrest system is recommended as a backup when a positioning system is in use. Although some equipment components may meet the requirements for all of these different uses, only the fall arrest use is addressed herein.

This standard addresses personal equipment and related methods for arresting falls of an individual from heights. It is the first of a series of American National Standards for Fall Protection for all occupational and non-occupational activities except those in SIC Division C (construction). It is not intended to apply to sports activities such as mountaineering. Other standards planned for the Z359 series will address the related subjects of climbing, positioning, manriding, rescue and evacuation. Hazards of moving and supporting people exist below and above ground and in confined as well as unconfined spaces. The Z359 standards series will apply to all of these circumstances.

This is also the first and only American National Standard on personal fall arrest systems which applies comprehensively to non-construction occupations and most non-occupational activities. It closely parallels the development of the ISO draft standard on "Personal Equipment for Protection Against Falls" (ISO/TC94/SC4). It is also consistent in most important respects with standards of other nations which have been developed in recent years.

This standard has an expanded vocabulary of the field which is deemed essential to illuminate the nuances and simplify explanations. The usefulness of the expanded vocabulary has been recognized and adopted by ISO/TC94/SC4. Once the reader masters the hierarchical relationship of the definitions of elements, components, subsystems and systems, the standard will become a versatile tool whether the reader be a researcher, designer, manufacturer, distributor, purchaser or user of the personal fall arrest equipment it addresses.

This standard, for the first time, addresses energy absorbers, fall arresters, self-retracting lanyards and anchorage connectors. It also deals for the first time with subsystems and complete systems comprised of combinations of the so-called "new" components and the more classical full body harness, lifeline, connector and lanyard components. Even the requirements imposed on "classi-



cal" components have undergone considerable change due to insights and new technology gained over the last twenty years.

Requirements for user training and user inspection, maintenance and use of equipment have been extensively addressed. Additionally, the requirements for manufacturers of personal fall arrest equipment to test, mark and instruct their products have been substantially addressed.

Fall arrest systems should be used whenever the hazard of falling from heights cannot be eliminated or controlled by alternative preventive measures. Although this standard's scope limits its application, the provisions and uses of the standard's requirements can be utilized in other industries and operations.

Governmental regulations (see CFR 1910.66 Appendix C) specify mandatory requirements for occupational fall prevention and fall arrest means. As a voluntary consensus standard, this standard complements those regulations. Compliance with this standard does not assure compliance with Governmental regulations and vice versa.

The Z359 Committee solicits public input that may suggest the need for revisions to this Standard. Such input should be sent to the Secretariat, American Society of Safety Engineers, 1800 E. Oakton Street, Des Plaines, IL 60018-2187.

This standard was developed and approved for submittal to ANSI by the American National Standards Committee on Standards for Fall Protection, Z359. Committee approval of the standard does not necessarily imply that all Committee members voted for its approval. At the time it approved this standard, the Z359 Committee had the following members:

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Secretary: David de Vries, P.E., CSP

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<sup>2</sup> Considered a non-voting member of the Committee for purposes of approving this standard.

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# American National Standard Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

## STANDARD REQUIREMENTS

## EXPLANATORY INFORMATION

(Not part of American National Standard Z359.1-1992 (R1999).)

### 1. *Scope, Purpose, Application, Exceptions and Interpretations*

**1.1 Scope** - This standard establishes requirements for the performance, design, marking, qualification, instruction, training, inspection, use, maintenance and removal from service of connectors, full body harnesses, lanyards, energy absorbers, anchorage connectors, fall arresters, vertical lifelines, and self-retracting lanyards comprising personal fall arrest systems for users within the capacity range of 130 to 310 pounds (59 to 140 kg).

#### 1.2 *Purpose and Application*

**1.2.1** This standard addresses only personal fall arrest systems (PFAS) incorporating full body harnesses. Whenever the term "system" is used in the standard it refers to a personal fall arrest system.

**1.2.2** This standard addresses equipment used in occupations requiring personal protection against falls from heights and applies to the manufacturers, distributors, purchasers and users of such equipment.

**1.2.3** Body belts, window cleaner belts, chest-waist harnesses and chest harnesses, even when referred to as body supports, are not addressed by the provisions of this fall arrest standard.

**1.2.4** Before any equipment shall bear the marking Z359.1 or be represented in any way as being in compliance with this standard, all requirements of this standard shall be met.

**E1.1.** See Figures 1 through 29 for illustrations of the equipment covered by this standard. Equipment used in personal fall arrest systems is commonly referred to as "personal protective equipment" (PPE) in the literature of the safety field. Also see 2.11 for definition of capacity. The manufacturer should apply a quality assurance system such as ANSI/ASQC Q94-1987. See reference 8.6.1.

**E1.2.1** See Appendix A for explanation of acronyms used within this standard.

**E1.2.2** This is a voluntary consensus standard. The legal requirements for protection against falls from heights are established by applicable regulatory bodies governing occupational safety.

**E1.2.3** For definitions of window cleaner belts, see reference 8.7.1.