

IEEE Std 1307™-2004
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IEEE Standard for Fall Protection for Utility Work

IEEE Power Engineering Society

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5 October 2004

Print: SH95217

PDF: 595217



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IEEE Standard for Fall Protection for Utility Work

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IEEE Power Engineering Society**

Approved 12 May 2004

American National Standards Institute

Approved 9 February 2004

IEEE-SA Standards Board

Abstract: General recommendations for fall protection and worker protection are provided. Sufficient details of the methods, equipment, and training requirements necessary to provide minimal risk procedures for personnel working at elevated worksites are presented.

Keywords: carabineer, engineered system, fall arrester, fall arrest system, fall prevention system, fall protection program, fall protection system (hardware), total fall distance, work positioning system, worker certification

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Print: ISBN 0-7381-3988-2 SH95217
PDF: ISBN 0-7381-3989-0 SS95217

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Introduction

This introduction is not part of IEEE Std 1307-2004, IEEE Standard for Fall Protection for Utility Work.

Fall protection equipment, work methods, and training for working in elevated positions has been applied to industry in general. Utilities are a very small and specialized part of general industry and therefore require specialized climbing practices. Federal regulation proposed in 1989 caused the utility industry to realize that general industry regulations were impractical when applied to utility structures and climbing practices. This standard was developed from a trial guide established to provide fall protection applications that are specific to the utility industry.

Injuries and death from falls have long been the concern of every worker and employer whose work involves worksites at elevated locations. As data has been accumulated regarding falls, it has been recognized that falls occurred because protective equipment, regardless of how minimal or inadequate, was ignored or misused. Workers died or sustained serious injury because they were not trained to use, or simply decided they did not need to use, fall protection. Today, in most areas of the utility industry, employers have mandatory requirements regarding the use of fall protection in accordance with current accepted practice. Together, modern day equipment and training can minimize the risk of a worker falling.

This standard was written by Standards Working Group, 15.07.02 of the IEEE Engineering in the Safety, Maintenance and Operations of Lines (ESMOL) Subcommittee 15.07. It includes contributions from Subcommittee 8, Part 4, Working Rules of Accredited Standards Committee C2, National Electrical Safety Code®, (NESC®), as well as persons from other national committees and organizations. The initial trial-use guide was reviewed, not only by electric utility organizations, but also by organizations associated with the communications, tree trimming, and structure painting industries. In accordance with the IEEE-SA Standards Board Implementation Plan for Metrics, metric units were used in the body of the document and the equivalent English units are listed as footnotes.

WARNING

Since fall prevention and protection practices for different circumstances are influenced by the nature of the circumstance, care shall be exercised when applying these practices to a specific job and location.

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IEEE Standard for Fall Protection for Utility Work

1. Overview

1.1 Scope

This standard provides general recommendations for a fall protection program for substation and generation structures and equipment, communication [including Community Antenna Television (CATV)], transmission, and distribution structures. It is not intended to include all of the proven practical methods and procedures; however, the selected recommendations covered under this standard are based on sound engineering principles, engineering safety considerations, and research into the tools, methods, practices, and training provided to and by electric power and communications workers.

This standard applies to electric distribution, transmission, and generation work, communications work (including CATV), line clearance tree trimming work (tree work performed from an aerial device or from a ladder), and structure painting. It does not include work in vaults, manholes, or other confined spaces. Requirements regarding floors and similar surfaces, stairways, guardrail systems, and scaffolding of all types are not considered in this standard.

1.2 Purpose

The purpose of this standard is to provide rules, work methods, and equipment specifications to protect employees covered under the standard from being injured by falls and provide emphasis to encourage further development in equipment, work methods, and training relating to fall protection programs used for utility work. This standard clearly differentiates between the processes of climbing to a worksite versus the actual activities at the worksite. This standard permits qualified climbers to free climb when it is safe to do so, but requires them to be attached while at the worksite.

1.3 Application

This standard is broad yet specific enough to apply to the fall protection of personnel climbing and working at a variety of elevated worksites considered for the utility industry. Since fall prevention and protection practices for different circumstances are influenced by the nature of the circumstance, care shall be exercised when applying these practices to a specific job and location.

1.4 General considerations

The procedures presented herein are intended to clarify and enhance other national, state, and local regulations and to add specific requirements applicable to the utility industry. They are not intended to replace their respective regulations. The rules of the administrative authority shall take precedence if a conflict exists between this standard and the administrative authority's rules.

2. References

This standard shall be used in conjunction with the following publications. When the following standards are superseded by an approved revision, the revision shall apply. In case of disagreement between this standard and a referenced standard, this standard shall govern.

Accredited Standards Committee C2-2002, National Electrical Safety Code[®] (NESC[®]).¹

ANSI A10.8-2001, American National Standard for Safety Requirements for Scaffolding.²

ANSI A10.14-1991, American National Standard for Construction and Demolition Operations—Requirements for Safety Belts, Harnesses, Lanyards, and Lifelines for Construction and Demolition Use.

ANSI A14.1-2000, American National Standard for Safety Requirements for Portable Wood Ladders.

ANSI A14.2-2002, American National Standard for Safety Requirements for Portable Metal Ladders.

ANSI A14.3-1992, American National Standard for Safety Requirements for Fixed Ladders.

ANSI A14.5-1992, American National Standard for Safety Requirements for Portable Reinforced Plastic Ladders.

ANSI A92.2-2002, American National Standard for Vehicle Mounted Elevating and Rotating Aerial Devices (SIA).

ANSI A92.3-1990, American National Standard for Elevating Work Platforms, Manually Propelled.

ANSI A92.5-1992, American National Standard for Elevated Work Platforms, Boom-Supported.

ANSI A92.6-2001, American National Standard for Work Platforms, Self Propelled Elevating.

ANSI Z133.1-2001, American National Standard for Safety Requirements for Tree Care Operations—Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting.

ANSI Z359.1-1992 (R-1999), American National Standard for Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components.

ASTM F711-02-2003, Standard Specification for Fiberglass-Reinforced Plastic (FRP) Rod and Tube Used in Live Line Tools.³

¹The NESC is available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA (<http://standards.ieee.org/>).

²ANSI publications are available from the Sales Department, American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

³ASTM publications are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA (<http://www.astm.org/>).

ASTM F887-97a, Standard Specifications for Personal Climbing Equipment—Pole and Tree Climbers.

ASTM F914-98, Standard Test Method for Acoustic Emission for Insulated Aerial Personnel Devices.

IEEE Std 516™-2003, IEEE Guide for Maintenance Methods on Energized Power Lines.^{4,5}

3. Definitions

For the purposes of this standard, the following terms and definitions apply. *The Authoritative Dictionary of IEEE Standards Terms*, Seventh Edition [B1]⁶ should be referenced for terms not defined in this clause.

3.1 activation distance: The distance traveled by a fall arrester or the amount of line paid out by a self-retracting lanyard from the point of onset of a fall to the activation point where the fall arrester begins to apply a braking or stopping force. This activation point is where the fall arrester engages the lifeline or, in the case of a self-retracting lanyard, where an internal brake engages. Activation distance is part of the free-fall distance experienced in a fall.

3.2 adjuster: A means to shorten or lengthen a strap, webbing, or rope.

3.3 administrative authority: The governmental authority exercising jurisdiction over application of this standard.

3.4 anchorage: A secure point of attachment to which the fall protection system is connected.

3.5 attached: A worker is connected to an anchorage when utilizing a fall protection system to prevent or arrest a fall.

3.6 belt, aerial: A single *D-ring* belt designed for attachment when a worker is in an aerial bucket or platform.

3.7 belt, line-worker's body: A belt that consists of a belt strap and D-rings, and may include a cushion section or a tool saddle.

3.8 belt, bucket: See: **belt, aerial**.

3.9 capacity: The combined weight for which the component is designed to be used. Combined weight includes the user's body weight and clothing, tools, and other objects borne or carried by the user.

3.10 carabineer: A connector component generally comprised of a trapezoidal or oval shaped body with a normally closed gate or similar arrangement that may be opened to permit the body to receive an object, and when released, automatically closes to retain the object. Three types of carabineers are described as follows:

- a) *Locking type* (required by this standard), with a self-closing, self-locking gate that remains closed and locked until intentionally unlocked and opened for connection or disconnection.
- b) *Non-locking type*, with a self-closing gate that remains closed, but not locked, until intentionally opened by the user for connection or disconnection.

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⁶The numbers in brackets correspond to those of the bibliography in Annex D.

- c) *Manual locking type*, with a self-closing gate that remains closed but not locked (unless purposely locked by the user) until intentionally opened by the user for connection or disconnection.

3.11 climber in training: A worker who is in training to become a qualified climber.

3.12 climbing: The vertical movement (ascending and descending) and horizontal movement to access or depart the worksite.

3.13 competent person: One who, because of training, experience, and authority is capable of identifying and correcting hazardous or dangerous conditions in the fall arrest system, or any component thereof under consideration, as well as its application and use with related equipment.

3.14 component slack distance: The distance due to the free movement between equipment components i.e., the distance obtainable when the D-ring and the attached snap hook move from the relaxed state to full tension.

3.15 deceleration distance: The additional vertical distance a falling worker travels, excluding lifeline elongation and free-fall distance, before stopping, from the point at which the energy-absorbing device begins to operate. It is measured as the distance between the location of a line-worker's body belt, aerial belt, or full-body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the energy absorbing device during a fall, and the location of that attachment point after the worker comes to a stop.

3.16 detachable ladder: A sectioned ladder designed specifically for the structure it is used on and is not always left permanently installed on the structure after access is no longer required.

3.17 detachable step: An individual ladder rung or step bolt used to access structures that is typically removed from the structure after access is no longer required.

3.18 D-ring: A connector used integrally in a line-worker's body belt, aerial belt, or full-body harness as an attachment element, and in lanyards, energy absorbers, lifelines and non-permanent boom attachments.

3.19 energy (shock) absorber: A component whose primary function is to dissipate energy and limit deceleration forces that the system imposes on the body during fall arrest. Such devices may employ various principles such as deformation, friction, tearing of materials, or breaking of stitches to accomplish energy absorption. An energy absorber causes an increase in the deceleration distance.

3.20 engineered system: A fall protection system that is designed and will operate to withstand the maximum expected impact load while maintaining a specified overload capacity factor (OCF).

3.21 equipment certification: An act or process resulting in documentation that attests to product performance.

3.22 fall arrester: A device such as a rope grab that travels on a lifeline and will automatically engage the lifeline and lock so as to arrest an accidental fall of a worker.

3.23 fall arrest system: The assemblage of equipment such as a full-body harness in conjunction with a connecting means, with or without an energy-absorbing device, and an anchorage to limit the forces a worker experiences during a fall. A fall arrest system is designed to prevent a worker, in the process of a fall, from falling more than the designed fall limit.

3.24 fall clearance distance: The total fall distance plus the distances between the location of a line-worker's body belt or full-body harness attachment point under load and the nearest possible point of contact, plus the dynamic elongation.

3.25 fall prevention system: A system, which may include a positioning system, intended to prevent a worker from falling from an elevation. Such systems include positioning device systems, guardrail, barriers, and restraint systems. Fall prevention systems are used in an attempt to prevent workers from falling from an elevation.

3.26 fall protection program: A plan intended to guard workers from injury due to falls from elevations.

3.27 fall protection system (hardware): Consists of either a fall prevention system or a fall arrest system.

3.28 flip-out: The action of a worker or test torso being unintentionally separated from the body support component during or after fall arrest. *Syn:* Fall-out

3.29 force test: A test that measures the arresting force that would be impacted on a worker during the maximum permitted free-fall.

NOTE—See 4.3.2.⁷

3.30 free-fall distance:

- a) *Fall arrest*—The vertical displacement of a fall arrest attachment point on the line-worker's full-body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, lifeline and lanyard elongation, but includes any energy absorbing device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur. The component slack (D-ring slide) distance should be included in the free-fall distance.
- b) *Work positioning*—The vertical displacement of the work positioning attachment point on the line worker's body belt or aerial belt between the onset of the fall and just before the worker or positioning equipment begins to retard the fall. The component slack (D-ring slide) distance should be included in the free-fall distance.

3.31 harness: A component with a design of straps that is fastened about the worker in a manner so as to contain the torso and distribute the fall arrest forces over at least the upper thighs, pelvis, chest, and shoulders with means for attaching it to other components or subsystems. *Syn:* full-body harness

3.32 jobsite: The assembly point at the structure or equipment where the workers, tools, and vehicles are assembled to perform the climbing to the worksite.

3.33 karabiner: *See:* **carabineer.**

3.34 lanyard: A flexible line of webbing, rope, wire rope, or strap that generally has a connector at each end for connecting the line-worker's body belt, aerial belt, or full-body harness to a energy absorbing device, lifeline, or, anchorage.

NOTE—Wire rope is reserved for special use only. It is required in operations where the lanyard is subject to being cut, and prohibited in the vicinity of energized facilities.

3.35 lifeline: A component consisting of a flexible line for connection to an anchorage or anchorage connector at one end to hang vertically (vertical lifeline), or for connection to anchorages or anchorage connectors at both ends to span horizontally (horizontal lifeline). Serves as a means for connecting other components of a fall arrest system to the anchorage. A lifeline serves to extend the range of the user through the slideable connection of a fall arrester in the case of a vertical lifeline, or a connector or other device in the case of a horizontal lifeline.

3.36 lineman's body belt: *See:* **belt, line-worker's body.**

⁷Notes in text, tables, and figures are given for information only, and do not contain requirements needed to implement the standard.