

American National Standard

for ladders –
fixed –
safety requirements



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American National Standard for Ladders – Fixed – Safety Requirements

Secretariat
American Ladder Institute

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American National Standards Institute, Inc

Foreword (This Foreword is not part of American National Standard ANSI A14.3-1984.)

This standard is a revision of American National Standard Safety Requirements for Fixed Ladders, ANSI A14.3-1974. It is one of a series of five standards prepared under the supervision of American National Standards Committee on Safety in the Construction, Care, and Use of Ladders, A14. All five standards have been developed by subcommittees reporting to American National Standards Committee A14. The subcommittees are: A14-1, Portable Wood Ladders; A14-2, Metal Ladders; A14-3, Fixed Ladders; A14-4, Job-Made Ladders; and A14-5, Portable Reinforced Plastic Ladders.

All five standards derive from the original American National Standard Safety Code for Construction, Care, and Use of Ladders, A14, which was first approved in 1923. Revisions were approved in 1935, 1948, and 1952. Prior to the 1948 revision, the Code contained some treatment of metal and fixed ladders. Requirements for these types of ladders were removed from the 1948 revision, which became American National Standard Code for Wood Ladders, ANSI A14.1-1948, because, in the opinion of the committee, the rapid development in the metal ladder field warranted special consideration and treatment of metal ladders and fixed ladders (usually metal) in separate standards.

Subcommittee A14-3 was created for the purpose of reviewing the data on fixed ladders originally contained in the Code prior to the 1948 revision, and making any changes or additions necessary to conform to the requirements of all interested groups. The A14.3 standard was submitted to the A14 Committee for letter ballot in December 1955 and was approved in 1956. A revision was published in 1974.

The present revision was begun in 1979 and was approved in 1981. However, an appeal led to reconsideration by the A14 Committee, and the current version was finally approved in 1984. Significant changes are in the statement of exceptions to the application of this standard and in the lengths of climbs as covered by this standard.

Suggestions for improvement of this standard will be welcome. They should be sent to the American Ladder Institute, 111 East Wacker Drive, Chicago, IL 60601.

This standard was processed and approved for submittal to ANSI by American National Standards Committee on Safety in the Construction, Care, and Use of Ladders, A14. 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 A14 Committee had the following members:

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American National Standard for Ladders – Fixed – Safety Requirements

1. General

1.1 Scope. This standard prescribes minimum requirements for the design, construction, and use of fixed ladders, and sets forth requirements for cages, wells, and ladder safety devices used with fixed ladders, in order to minimize personal injuries. All parts and appurtenances necessary for a safe and efficient ladder shall be considered integral parts of the design.

1.2 Purpose. The purpose of this standard is to provide safety for life, limb, and property by establishing minimum standards for the design and installation of fixed ladders.

1.3 Application. The methods employed to ensure compliance with this standard shall be determined by the proper regulatory or administrative authority.

1.4 Pitch. This standard covers fixed ladders within the pitch range of 60 to 90 degrees from the horizontal.

1.4.1 Preferred Pitch. The preferred pitch of fixed ladders shall be considered to be within the range of 75 to 90 degrees from the horizontal (see Fig. 1).

1.4.2 Substandard Pitch. Fixed ladders shall be considered substandard if they are installed within the substandard pitch range of 60 to 75 degrees from the horizontal. Substandard fixed ladders shall be permitted only where it is found necessary to meet installation conditions (see Fig. 1). This substandard pitch range shall be considered a critical range, to be avoided if possible.

1.4.3 Pitch Greater Than 90 Degrees. Ladders having a pitch in excess of 90 degrees from the horizontal shall not be permitted.

1.5 Exceptions

1.5.1 This standard is intended for application to the types of structures depicted and described in the standard (i.e., buildings, wells, and shafts). It sets forth the criteria (what is needed) necessary to build a fixed ladder in a certain way and manner (how to build). The standard does not contemplate special or unique (as to where and when) applications of the requirements, although individual requirements, or a combination of requirements, may apply universally.

1.5.2 This standard establishes requirements for fixed ladders in order to promote a greater degree of standardization. In cases where difficulty is encountered in complying with the standard, or where there are special service conditions, it is expected that the administrative authority will grant exceptions from the literal requirements of the standard, or will permit the use of alternative designs or features, if equivalent safety is thereby secured (see 1.9).

1.6 Existing Installations

1.6.1 The requirements of this standard shall not apply to existing installations, provided they meet one of the following conditions:

(1) The installation was made in compliance with a state, federal, or consensus standard that was in existence and applicable at the time of installation, and documentation is available to substantiate this.

(2) The installation differs from the design measurements of this standard by a degree, determined by an individual competent in structural design, such that its performance will not substantially deviate from the requirements of this standard.

1.6.2 If the existing installation is subsequently modified or replaced, or if repairs on more than 25 percent of the total unit are required, the installation shall be made to conform to the requirements of this standard.

1.7 Interpretation

1.7.1 This standard is designed to serve as a guide for regulatory bodies or administrative agencies in the formulation of laws and regulations. It is also intended for voluntary use by establishments that use or design fixed ladders, or manufacture them for installation.

1.7.2 To secure uniform application of this standard, it is recommended that suggestions involving changes in the requirements or disputes over their interpretation be referred to the organization holding the secretariat of this standard:

American Ladder Institute, 111 East Wacker Drive,
Chicago, IL 60601.

1.8 Mandatory and Advisory Rules. Mandatory requirements of this standard are indicated by the word "shall." If a requirement is of an advisory nature, it is indicated by the word "should" or is stated as a recommendation.

1.9 Equivalent. The word "equivalent" in this standard shall be interpreted to mean an alternative design, feature, construction, connection, or material providing equal performance.

1.10 Recognized Design Practice. The term "recognized design practice" in this standard shall be interpreted to mean the use and application of those specifications contained in the standards cited in Section 2 and 4.3.

2. Related Standards

2.1 Related American National Standards. This standard is intended for use with the following American National Standards (see Section 10).

American National Standard Requirements for Safety Belts, Harnesses, Lanyards, Lifelines, and Drop Lines for Construction and Industrial Use, ANSI A10.14-1975

American National Standard Safety Requirements for Floor and Wall Openings, Railings, and Toeboards, ANSI A12.1-1973

American National Standard Safety Code for Ladders — Portable Wood — Safety Requirements, ANSI A14.1-1982

American National Standard Safety Code for Elevators and Escalators, ANSI/ASME A17.1-1981

American National Standard Lightning Protection Code, ANSI/NFPA 78-1983

2.2 Other Related Standards

Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, AISC S310-1980¹

Specification for Structural Steel, ASTM A36-81a²

Construction Manual Series, Section 1, Specifications for Aluminum Structures, AA SAS-30-1982³

¹ Available from American Institute of Steel Construction, P.O. Box 4588, Chicago, IL 60680.

² Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

³ Available from The Aluminum Association, 818 Connecticut Avenue, NW, Washington, DC 20006.

National Design Specification for Wood Construction, 1982⁴

3. Definitions

cage. A barrier, which may be referred to as a cage guard or basket guard, that is an enclosure mounted on the side rails of the fixed ladder or fastened to the structure to enclose the climbing space of the ladder in order to safeguard the employee climbing the ladder.

carrier. The track of a ladder safety device consisting of a flexible cable or rigid rail, which is secured to the ladder or structure by mountings.

fastening. Attaching a ladder to a structure, building, or equipment.

ladder. A device incorporating or employing steps, rungs, or cleats on which a person may step to ascend or descend.

ladder safety device. A vertical support system, other than a cage or well, used in conjunction with a ladder, which will limit a person's fall from the ladder without that person having to continually manipulate the device or any part thereof.

landing. Any area such as the ground, roof, or platform that provides access/egress for a fixed ladder.

length of climb. The total vertical distance a person could climb in traveling between the extreme points of access/egress for a fixed ladder, whether the ladder is of an unbroken length or consists of multiple sections. This total vertical distance is determined by including all spaces between all ladder steps or rungs and all other vertical intervening spaces between the extreme points of access/egress.

mounting. A means for attaching a cage or a ladder safety device to a ladder.

pitch. The included (acute) angle between the horizontal and the ladder, which is measured on the opposite side of the ladder from the climbing side. The pitch is usually expressed as H/L , which is the horizontal distance, H , from the base of the ladder to the supporting surface divided by the working length, L , of the ladder.

platform. A landing surface that is used as a working or standing location.

⁴ Available from National Forest Products Association, 1619 Massachusetts Avenue, NW, Washington, DC 20036.

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rail. The side members jointed at intervals by either rungs or steps.

rail ladder. A fixed ladder consisting of side rails joined at regular intervals by rungs and fastened full length or in sections to a building, structure, or equipment.

safety belt. A high-strength belt or harness attached to a fall-limiting device that is worn by individuals working at elevated locations and specifically designed to secure, suspend, or retrieve the user.

safety sleeve. That part of a ladder safety device consisting of the moving component with locking mechanism that travels on the carrier and makes the connection between the carrier and the safety belt.

side-step ladder. A rail ladder that requires a person getting off at the top to step sideways from the ladder in order to reach a landing.

step surfaces. The clear portions of steps or rungs on which a person may step while ascending or descending a ladder.

through ladder. A rail ladder that requires a person getting off at the top to step through the ladder in order to reach a landing.

toeboard. A barrier erected along the exposed edges of a platform or landing surface to prevent falls of materials or tools that would create hazards to persons below.

well (shaft). A walled enclosure around a fixed ladder that provides the person climbing the ladder with the same protection as a cage.

4. General Design Criteria

4.1 Maximum Ladder Lengths and Protection Requirements

4.1.1 A cage, well, or ladder safety device shall not be required where the length of climb is 24 feet or less above or below ground level, or above or below a floor or roof with access/egress from ground level, floor, or roof (see Fig. 2).

4.1.2 A cage or ladder safety device shall be provided where the length of climb is less than 24 feet but the top of the ladder is at a distance greater than 24 feet above ground level, floor, or roof (see Fig. 3).

4.1.3 A cage, well, or ladder safety device shall be provided where a single length of climb is greater than 24 feet but does not exceed 50 feet (see Fig. 4).

4.1.4 Ladders having a length of climb greater than 50 feet (see Fig. 5a) shall be provided with a cage, well, or ladder safety device and shall meet the requirements in 4.1.4.1 or 4.1.4.2, whichever is applicable.

4.1.4.1 Where cages or wells are used:

(1) The ladder shall consist of multiple sections.

(2) Each section shall be horizontally offset from adjacent sections.

(3) A landing platform shall be provided at least every 50 feet within the length of climb.

4.1.4.2 Where ladder safety devices are used, the length of climb may be continuous, but rest platforms shall be provided at maximum intervals of 150 feet (see Fig. 5b).

4.1.5 All parts and surfaces of fixed ladder installations shall be free of sharp edges, burrs, or other details that may be hazardous to the person using the ladder.

4.2 Design Loads. All ladders, platforms, appurtenances, and fastenings shall be designed to meet the load requirements described in 4.2.1 through 4.2.3.

4.2.1 Live Loads for Ladders

4.2.1.1 Live Loads Imposed by Persons. Live loads imposed by persons shall be as follows:

(1) The minimum design live load shall be two loads of 250 pounds each concentrated between any two consecutive attachments. Each step or rung in the ladder shall be designed for a single concentrated live load of 250 pounds minimum.

(2) The number and position of additional concentrated live load units of 250 pounds each, determined from anticipated usage of the ladder, shall be considered in the design.

4.2.1.2 Other Live Loads. The following live loads shall be considered in the design, where applicable:

(1) A uniform coating of ice on all parts of the ladder

(2) A wind load on all parts of the ladder

(3) The weight of rigging attached to the ladder, including the load to be lifted

(4) Anticipated impact loads resulting from the use of ladder safety devices

4.2.1.3 Live Load Concentration. All live loads shall be considered to be concentrated at such a point or points as will cause the maximum stress in the structural member in question.

4.2.2 Live Loads for Platforms. All platforms shall be designed for a uniform minimum live load of 100 pounds per square foot over the entire platform area; for the live loads resulting from ladders secured directly to the platforms; and for other live loads as indicated in 4.2.1.2.