

NFPA 1932
Standard on
Use, Maintenance,
and Service Testing
of Fire Department
Ground Ladders
1994 Edition



NOTICE

All questions or other communications relating to this document should be sent only to NFPA headquarters, addressed to the attention of the Committee responsible for the document.

For information on the procedures for requesting Technical Committees to issue Formal Interpretations, proposing Tentative Interim Amendments, proposing amendments for Committee consideration, and appeals on matters relating to the content of the document, write to the Secretary, Standards Council, National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

A statement, written or oral, that is not processed in accordance with Section 16 of the Regulations Governing Committee Projects shall not be considered the official position of NFPA or any of its Committees and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Users of this document should consult applicable federal, state and local laws and regulations. NFPA does not, by the publication of this document, intend to urge action that is not in compliance with applicable laws, and this document may not be construed as doing so.

Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

Licensing Provision—This document is copyrighted by the National Fire Protection Association (NFPA).

1. Adoption by Reference—Public authorities and others are urged to reference this document in laws, ordinances, regulations, administrative orders, or similar instruments. Any deletions, additions, and changes desired by the adopting authority must be noted separately. Those using this method are requested to notify the NFPA (Attention: Secretary, Standards Council) in writing of such use. The term "adoption by reference" means the citing of title and publishing information only.

2. Adoption by Transcription—A. Public authorities with lawmaking or rule-making powers only upon written notice to the NFPA (Attention: Secretary, Standards Council), will be granted a royalty-free license to print and republish this document in whole or in part, with changes and additions, if any, noted separately, in laws, ordinances, regulations, administrative orders, or similar instruments having the force of law, provided that: (1) due notice of NFPA's copyright is contained in each law and in each copy thereof; and (2) that such printing and republication is limited to numbers sufficient to satisfy the jurisdiction's lawmaking or rule-making process. B. Once this NFPA Code or Standard has been adopted into law, all printings of this document by public authorities with lawmaking or rule-making powers or any other persons desiring to reproduce this document or its contents as adopted by the jurisdiction in whole or in part, in any form, upon written request to NFPA (Attention: Secretary, Standards Council), will be granted a nonexclusive license to print, republish, and vend this document in whole or in part, with changes and additions, if any, noted separately, provided that due notice of NFPA's copyright is contained in each copy. Such license shall be granted only upon agreement to pay NFPA a royalty. This royalty is required to provide funds for the research and development necessary to continue the work of NFPA and its volunteers in continually updating and revising NFPA standards. Under certain circumstances, public authorities with lawmaking or rule-making powers may apply for and may receive a special royalty where the public interest will be served thereby.

3. Scope of License Grant—The terms and conditions set forth above do not extend to the index to this document.

(For further explanation, see the Policy Concerning the Adoption, Printing, and Publication of NFPA Documents, which is available upon request from the NFPA.)

Statement on NFPA Procedures

This material has been developed under the published procedures of the National Fire Protection Association, which are designed to assure the appointment of technically competent Committees having balanced representation. While these procedures assure the highest degree of care, neither the National Fire Protection Association, its members, nor those participating in its activities accept any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text.

NFPA has no power or authority to police or enforce compliance with the contents of this document, and any certification of products stating compliance with requirements of this document is made at the peril of the certifier.

Copyright © 1994 NFPA, All Rights Reserved

NFPA 1932
Standard on
Use, Maintenance, and Service Testing of
Fire Department Ground Ladders
1994 Edition

This edition of NFPA 1932, *Standard on Use, Maintenance, and Service Testing of Fire Department Ground Ladders*, was prepared by the Technical Committee on Fire Department Ground Ladders and acted on by the National Fire Protection Association, Inc., at its Annual Meeting held May 16–18, 1994, in San Francisco, CA. It was issued by the Standards Council on July 14, 1994, with an effective date of August 5, 1994, and supersedes all previous editions.

The 1994 edition of this document has been approved by the American National Standards Institute.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

Origin and Development of NFPA 1932

In 1984, the text of NFPA 1931 was divided into two documents with NFPA 1931 containing the requirements for manufacturers on design and design verification testing for new ground ladders. This document was developed as a companion document to cover the requirements of the use, maintenance, and service testing of fire department ground ladders.

The 1989 edition added requirements for routine maintenance as well as additional cautions regarding accidental heating of ladders. The horizontal bending test for folding ladders was added. The horizontal bending test for extension ladders was modified to reflect changes determined acceptable from field experience with the use of the test method.

This edition of the standard removed an exception that allowed the authority having jurisdiction to use a reduced test weight for the horizontal bending test for extension ladders built prior to 1984. This exception was in previous editions to allow a phase in to the more stringent testing requirement introduced in 1984. The standard was revised in a number of places to keep it up to date, including adding requirements for retrofitting heat sensor labels after appropriate testing.

Technical Committee on Fire Department Ground Ladders

Jeffrey Bowman, Chair
Anaheim Fire Dept., CA

Brian D. Berchtold, Middlebush Vol. Fire Dept., NJ
David R. Bouchard, Fire Consulting Assoc. Inc., RI
Samuel C. Cramer, Aluminum Ladder Co., SC
Carl M. Frimel, Independence Fire Dept., OH
Dennis N. Gage, ISO Commercial Risk Services, Inc., NJ

Kurt Kenworth, Alaco Ladder Co., CA
Gary Meier, City of West Covina Fire Dept., CA
A. K. Rosenhan, Mississippi State University, MS
Bradley J. Schmidt, Underwriters Laboratories Inc., IL
Philip Schwab, Duo-Safety Ladder Corp., WI

Alternate

Boyd F. Cole, Underwriters Laboratories Inc., IL
(Alt. to B. J. Schmidt)

Carl E. Peterson, NFPA Staff Liaison

This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on the design, inspection, testing, and use of ground ladders for the fire service.

Contents

Chapter 1 Administration	1932- 4	4-2 Additional Requirements for Roof Ladders Only	1932- 7
1-1 Scope	1932- 4	4-3 Additional Requirements for Extension Ladders Only	1932- 7
1-2 Purpose	1932- 4		
1-3 Definitions	1932- 4		
Chapter 2 Ground Ladder Mounting	1932- 5	Chapter 5 Service Testing Ground Ladders . .	1932- 8
2-1 Requirements for All Ground Ladders	1932- 5	5-1 Requirements for All Ground Ladders	1932- 8
Chapter 3 Use of Ground Ladders	1932- 5	5-2 Strength Service Testing Requirements for All Ladders Except Pompier and Folding Ladders	1932- 9
3-1 Requirements for All Ground Ladders	1932- 5	5-3 Strength Service Testing Requirements for Pompier Ladders Only	1932-10
3-2 Additional Requirements for Extension Ladders Only	1932- 6	5-4 Hardness Service Testing Requirements for Metal Ground Ladders Only	1932-11
3-3 Additional Requirements for Metal Ground Ladders Only	1932- 6	5-5 Strength Service Testing Requirements for Folding Ladders Only	1932-11
3-4 Additional Requirements for Wood Ground Ladders Only	1932- 6	Appendix A Explanatory Material	1932-12
3-5 Additional Requirements for Fiberglass Ground Ladders Only	1932- 6	Appendix B Referenced Publications	1932-14
Chapter 4 Inspection and Maintenance of Ground Ladders	1932- 6	Index	1932-14
4-1 Requirements for All Ground Ladders	1932- 6		

NFPA 1932**Standard on****Use, Maintenance, and Service Testing of
Fire Department Ground Ladders****1994 Edition**

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A.

Information on referenced publications can be found in Appendix B.

Chapter 1 Administration**1-1 Scope.**

1-1.1* This standard specifies requirements for the use, maintenance, inspection, and service testing of fire department ground ladders.

1-1.2* This standard shall apply to all ground ladders, regardless of year of manufacture, used by fire departments for rescue, fire fighting operations, and training. Fire department ground ladders shall not be used for any other purpose.

1-1.3 The service tests specified in this standard shall be the only tests conducted by fire department personnel, or other testing personnel, on in-service fire department ground ladders.

1-2* Purpose.

1-2.1 The purpose of this standard shall be to provide reasonable safety for fire fighters and victims during the use of fire department ground ladders.

1-2.2 This standard also shall provide users of fire department ground ladders with a means to determine if in-service fire department ground ladders are suitable for continued service.

1-3 Definitions.

Angle of Inclination. The pitch for portable, non-self-supporting ground ladders. The preferred angle of inclination is $75\frac{1}{2}$ degrees.

Approved.* Acceptable to the authority having jurisdiction.

Authority Having Jurisdiction.* The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

Base (Bed) Section. The lowest or widest section of an extension ladder.

Beam (Side Rail). The main structural side of the ground ladder.

Bedded Position. The position in which the fly section(s) of an extension ladder is fully retracted with the pawls engaged.

Butt. The end of the beam placed on the ground, or other lower support surface, when ground ladders are in the raised position. It may be the lower end of beams, or added devices.

Butt Spurs (Feet). That component of ground ladder support that is in contact with the lower support surface to reduce slippage. It may be the lower end of beams, or added devices.

Collapsible Ladder. See Folding Ladder.

Combination Ladder. A ground ladder capable of being used as both a step ladder and a single or extension ladder.

Designated Length. The length marked on the ladder.

Design Verification Tests. Tests of a ladder structure and components thereof to prove conformance to the requirements of this standard. Design verification tests are the responsibility of the manufacturer and are to be performed only on new, unused ladders, which shall be destroyed after completion of the tests. These tests shall not be performed by fire departments.

Dogs. See Pawls.

Duty Rating. The recommended in-service working load.

Extension Ladder. A non-self-supporting ground ladder, adjustable in length. It consists of two or more sections traveling in guides, brackets, or equivalent so arranged as to permit length adjustment.

Fire Department Ground Ladder. Any portable ladder specifically designed for fire department use in rescue, fire fighting operations, or training, and not permanently attached to fire apparatus.

Fly Section. The upper section(s) of an extension ladder.

Folding Ladder. A single-section ladder with rungs that can be folded or moved to allow the beams to be brought into a position touching or nearly touching each other.

Free Weight. Test weights that are not controlled from any direction except by the force of gravity. For example: sand bags, concrete blocks, water tanks, or lead weights.

Halyard. Rope used on extension ladders for the purpose of raising fly section(s). A wire cable may be referred to as halyard when used on the uppermost fly section(s) of 3- or 4-section extension ladders.

Heat Sensor Label. A label that turns color at a preset temperature to indicate heat exposure.

In-Service Fire Department Ground Ladder. Any ground ladder that meets the requirements of this standard and currently is in use or available for use by a fire department.

Inside Ladder Width. The distance measured from the inside edge of one beam to the inside edge of the opposite beam. (See also *Outside Ladder Width*.)

Ladder. A device on which a person climbs for ascending or descending. This device consists of two beams (side rails) joined at regular intervals by cross pieces called rungs

on which a person is supported during this climb. (*See also Pompier Ladder, an exception to this definition.*)

Ladder Nesting. The procedure whereby ladders of different sizes are positioned partially within one another to reduce the amount of space required for their storage on the apparatus.

Maximum Extended Length. The total length of the extension ladder when all fly sections are fully extended and pawls engaged.

May. This term is used to state a permissive use, or an alternative method to a specified requirement.

Non-Destructive Tests (NDT). A method of testing that does not damage the ladder structure, or components thereof.

Outside Ladder Width. The distance measured from the outside edge of one beam to the outside edge of the opposite beam, or the widest point of the ladder including staypoles when provided, whichever is greater. (*See also Inside Ladder Width.*)

Pawls. Devices attached to fly section(s) for the purpose of anchoring fly section(s) when extension ladders are used in the extended position. Pawls engage ladder rungs near the beams for anchoring purposes.

Permanent Deformation (Set). That deformation remaining in any part of a ladder or its components after all test loads have been removed from the ladder.

Pompier Ladder (Scaling Ladder). A ladder having a single beam only with a large hook on top used for scaling.

Roof Ladder. A single ladder equipped with hooks at the top end of the ladder.

Rungs. The ladder cross pieces on which a person steps while ascending or descending.

Scaling Ladder. See Pompier Ladder.

Service Tests. Tests performed on a ground ladder to determine it is suitable for service.

Set. See Permanent Deformation.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Side Rail. See Beam.

Single Ladder. A non-self-supporting ground ladder, non-adjustable in length, consisting of only one section.

Staypoles (Tormentors). Poles attached to each beam of the base section of extension ladders and used to assist in the raising of the ladder and to help provide stability of the raised ladder.

Tested. Verification of compliance with test requirements as specified in this standard.

Test Failure. Failure of the ground ladder structure, or components thereof, to pass the required tests.

Tormentors or Tormentor Poles. See Staypoles.

Ultimate Failure. Collapse of a ground ladder structure, or components thereof.

Visible Damage. A permanent change in condition that is clearly evident by visual inspection without recourse to optical measuring or observing devices.

Visual Inspection. Observation by eye unaided by optical devices, except prescription eyeglasses or lenses.

Working Length. The length of a non-self-supporting portable ladder measured along the beams from the base support point of the ladder to the point of bearing at the top.

Chapter 2 Ground Ladder Mounting

2-1 Requirements for All Ground Ladders.

2-1.1 Ground ladders shall not be forced into brackets or slides on fire apparatus. Ground ladder nesting requirements shall be based on outside ladder width.

2-1.2 Ground ladders shall be protected to prevent movement and abrasion, or other damage, to the ground ladder while on fire apparatus.

2-1.3 When mounted on the apparatus, ground ladders shall not be subject to exposure to heat sources (such as engine heat) of 300°F (149°C) or greater.

2-1.4 Side- or top-mounted ground ladders shall be provided with sufficient supports to prevent any sagging or distortion.

Chapter 3 Use of Ground Ladders

3-1 Requirements for All Ground Ladders.

3-1.1* Ground Ladder Loading. Duty ratings for various ground ladders are given in Table 3-1.1. These loads shall not be imposed upon ground ladders unless the ground ladder is set at the correct angle of inclination and secured as specified in this section. The total weight on the ground ladder including persons, their equipment, and any other weight, such as a charged fire hose, shall not exceed the duty rating load.

Table 3-1.1 Ground Ladder Duty Rating

Type	Maximum Load	
	(lb)	(kg)
Folding ladders	300	136
Pompier ladders	300	136
Single and roof ladders	750	340
All extension ladders	750	340
Combination ladders	750	340

3-1.2 If, in an emergency, ground ladders are used other than as specified in this standard, they shall be removed from service, inspected, and service tested prior to further use.

3-1.3 Damaged ground ladders, or ground ladders having defects, shall be removed from service, marked, repaired, and service tested prior to further use. Temporary repairs of damaged or missing ladder parts shall not be made.

3-1.4 Ground ladders shall be used for rescue, fire fighting operations, and training and shall not be used for any other purpose.

3-1.5 Ground ladders shall not be tied together to provide longer units.

3-1.6 Ground ladder butts shall be placed on a secure footing with a firm, level base before using.

3-1.7 Ground ladders shall not be placed on ice, snow, or slippery surfaces unless suitable means to prevent slipping are employed.

3-1.8* Ground ladders shall be secured at the base, either by a fire fighter or mechanical means, to prevent slippage. Extreme caution shall be used when the angle of inclination is less than 70 degrees, and mechanical means shall be used to prevent slippage.

3-1.9 Ground ladders shall be secured at the top, to prevent slippage, by the first person to climb the ladder.

3-1.10* To provide the optimum combination of load carrying and stability, ground ladders shall be set at the correct angle of inclination by positioning the base section a horizontal distance from the vertical wall equal to $\frac{1}{4}$ the effective working length of the ground ladder, an angle of between 70 and 76 degrees with $75\frac{1}{2}$ degrees being optimum.

3-1.11 Raised ground ladders shall not be slid along cornices or roof edges.

3-1.12 Ground ladders shall not be "rolled" beam-over-beam to reach a new position.

3-1.13 Raised ground ladders shall not be repositioned from the top or with a person on the ladder.

3-1.14 Ground ladders that have been removed from apparatus shall not be placed near heat sources (such as the apparatus exhaust pipe) such that the ladders are exposed to heat of 300°F (149°C) or greater.

3-2 Additional Requirements for Extension Ladders Only.

3-2.1 Fly sections of extension ladders shall not be used as single ladders unless they have been certified by the manufacturer as being suitable for single ladder use.

3-2.2 Extension ladders shall be used in the fly-up, fly away from the building position unless otherwise specified by the manufacturer.

3-2.3* Halyards on extension ladders shall be securely tied off to the base section or otherwise secured before the ground ladder is climbed.

3-2.4 Extension ladders shall only be operated from the ground or other suitable stationary points. Adjustments shall not be made from the top of extension ladders.

3-2.5 When extension ladders are equipped with staypoles, the staypoles shall be placed to act as stabilizers, and shall not be placed as to become load-bearing members under no load conditions (no one on the ladder).

3-2.6* When the extension ladder is equipped with staypoles and both poles cannot be properly placed due to obstructions or terrain, neither staypole shall be placed.

3-3 Additional Requirements for Metal Ground Ladders Only.

3-3.1 **EXTREME CAUTION** shall be used when working around charged electrical circuits as metal ground ladders conduct electricity. All metal ground ladders shall be kept away from power lines or other potential electrical hazards.

3-3.2 The heat sensor labels shall be checked before and after each use of the ladder. If the heat sensor label has changed, the ladder shall be removed from service and service tested as specified in Chapter 5 of this standard prior to further use.

3-4 Additional Requirements for Wood Ground Ladders Only.

3-4.1* **EXTREME CAUTION** shall be used around electrical hazards, as wet wood ground ladders can conduct electricity.

3-4.2 If the protective finish becomes charred or blistered, the ladder shall be removed from service and service tested as specified in Chapter 5 of this standard prior to further use.

3-5 Additional Requirements for Fiberglass Ground Ladders Only.

3-5.1* **EXTREME CAUTION** shall be used around electrical hazards as wet fiberglass ground ladders can conduct electricity.

3-5.2 The heat sensor labels shall be checked before and after each use of the ladder. If the heat sensor label has changed, the ladder shall be removed from service and service tested as specified in Chapter 5 of this standard prior to further use.

3-5.3 Fiberglass ground ladders that have been subjected to any sharp impact shall be removed from service and service tested as specified in Chapter 5 of this standard prior to further use.

3-5.4 Fiberglass ground ladders shall not be used where they can be exposed to temperatures of 300°F (149°C) or more while supporting their rated load.

Chapter 4 Inspection and Maintenance of Ground Ladders

4-1 Requirements for All Ground Ladders.

4-1.1 All ground ladders shall be inspected and maintained in accordance with the manufacturer's recommendations.

4-1.2 Ground ladders shall be visually inspected at least once every month and after each usage.

4-1.3 Visual inspection shall include but not be limited to:

(a) Heat sensor label on metal and fiberglass ladders, and on wood ladders when provided, for change indicating heat exposure;

(b) All rungs, for snugness and tightness;

(c) All bolts and rivets, for tightness;

(d) Welds, for any cracks or apparent defects;

- (e) Beams and rungs, for cracks, splintering, breaks, gouges, checks, wavy conditions, or deformation;
- (f) Butt spurs, for excessive wear or other defects;
- (g) Halyards, for fraying or kinking;
- (h) Roof hooks, for sharpness;
- (i) Rungs, for punctures, wavy conditions, worn serrations, or deformation;
- (j) Surface corrosion;
- (k) Ladder slide areas, for galling or absence of wax, if required by the manufacturer;
- (l) Loss of gloss on fiberglass and wood ladder beams.

4-1.4 Any signs of failure during visual inspection shall be sufficient cause to remove the ground ladder from service and repair for fire service use or to destroy.

4-1.5 Ground ladders shall be maintained as free of moisture as is possible and shall be wiped after being sprayed with water or used in the rain.

4-1.6 Ground ladders shall not be stored in an area where they are exposed to the elements.

4-1.7 Ground ladders shall not be painted except for the top and bottom 18 in. (457 mm) of each section for purposes of identification or visibility.

4-1.8 Ground ladders not maintained as specified in this standard shall be removed from service and service tested as specified in Chapter 5 prior to further use.

4-1.9 The rollers and other moving parts of the frame holding the ground ladders on the apparatus shall be lubricated in accordance with the apparatus manufacturer's instructions at least every six months. Prior to re-lubricating rollers or moving parts, old lubricant shall be removed. If rollers and other moving parts are rusted, they shall be brushed with a wire brush and cleaned to remove all loose scale, and then painted before lubricating.

4-1.10 Heat Sensor Labels.

4-1.10.1* If the heat sensor label has an expiration date and that date has passed, the heat sensor label shall be replaced.

4-1.10.2 If the ladder is constructed of metal or fiberglass materials and it does not have heat sensor labels, the ladder shall be tested in accordance with Chapter 5 of this standard. If the ladder passes all the tests, heat sensor labels shall be applied to the ladder. The heat sensor labels shall be located on the inside of each beam of each section immediately below the second rung from the tip of each section and immediately below the center rung of that section.

4-1.11 Additional Requirement for Metal Ground Ladders Only. To preserve the surface finish and inhibit corrosion, an occasional application of a good automotive paste wax shall be used. If an abrasive pad is used to remove corrosion before applying wax, care shall be exercised to avoid electrolytic action. Steel wool shall not be used on aluminum.

4-1.12 Additional Requirements for Wood Ground Ladders Only.

4-1.12.1 Visual inspection shall include the bolts for snugness and tightness without crushing the wood.

4-1.12.2 When a wood ground ladder develops dark streaks in the beams, the ladder shall be removed from service and service tested as specified in Chapter 5 of this standard prior to further use.

4-1.12.3* Wood ground ladders shall be stored away from steam pipes, radiators, forced hot air heaters, and out of the direct sunlight.

4-1.12.4 Wood ground ladders shall be protected by at least 3 coats of phenolic-tung oil varnish with ultra-violet ray inhibitors.

4-1.12.5 The varnish finish shall be inspected at least every month and redone at least annually or at such frequency as specified by the ladder manufacturer.

4-1.12.6 If the varnish coating becomes damaged, the following procedure shall be conducted to repair the finish:

(a) Peeling areas shall be removed by scraping and sanding with sandpaper to remove all the loose or damaged finish,

(b) Bare sanded spots shall be spot-primed with varnish,

(c) The coating shall be resanded when dry and coated with at least two coats of a good quality clear spar varnish.

4-1.13 Additional Requirements for Fiberglass Ground Ladders Only.

4-1.13.1* Fiberglass ground ladders shall be stored out of direct sunlight.

4-1.13.2 To preserve the surface finish and inhibit surface deterioration, an occasional application of a good automotive paste wax shall be used.

4-2 Additional Requirements for Roof Ladders Only.

4-2.1 These inspection requirements shall be in addition to the inspection and maintenance requirements specified in Section 4-1 of this chapter.

4-2.2 Visual inspection shall include an operational check of the roof hook assemblies for proper operation. Folding roof hook assemblies shall be kept operational by removing rust and other contaminants and by keeping the mechanisms lubricated.

4-3 Additional Requirements for Extension Ladders Only.

4-3.1 These inspection and maintenance requirements shall be in addition to the inspection and maintenance requirements specified in Section 4-1 of this chapter.

4-3.2 Visual inspection shall include an operational check of the pawl assemblies for proper operation.

4-3.3* Pawl assemblies shall be kept cleaned and lubricated in accordance with manufacturer's instructions.

4-3.4 Ladder slide areas shall be kept lubricated in accordance with manufacturer's instructions.

4-3.5* Halyards and wire cables on extension ladders shall be replaced when they become frayed or kinked.

4-3.6 Wire rope on 3- and 4-section ladders shall be snug, when the ladder is in the bedded position, to ensure proper synchronization of upper sections during operation.

Chapter 5 Service Testing Ground Ladders

5-1 Requirements for All Ground Ladders.

5-1.1 Design verification tests specified in NFPA 1931, *Standard on Design of and Design Verification Tests for Fire Department Ground Ladders*, shall NOT be performed by fire departments. Design verification tests to certify compliance with NFPA 1931 shall be the responsibility of the ground ladder manufacturer only.

5-1.2 Only the service tests for ground ladders specified in this chapter shall be conducted by fire departments on fire department ground ladders.

5-1.2.1* The fire department may contract with an approved testing organization to perform the service tests specified in this chapter.

5-1.3* Caution shall be used when performing service tests on ground ladders to prevent damage to the ladder or injury to personnel during testing. The test load shall be placed on the ladder in a manner so as to avoid any shocks or any impact loading. These service tests may require the purchase of measuring instruments.

5-1.4 Personnel involved in service testing shall be competently trained in the service testing procedures and equipment. Personnel shall be fully cognizant at all times of the possibility of sudden and dramatic failure of the ground ladder undergoing service testing, and shall take all personal safety precautions possible to protect themselves.

5-1.5 Any ground ladder that appears to be unserviceable, or bordering on unserviceability, shall be service tested or destroyed.

5-1.6 Any signs of failure during service testing shall be sufficient cause for the ground ladder to be removed from service and repaired for fire service use or destroyed.

5-1.7 All ground ladders shall be service tested on the following schedule:

- (a) At least annually;
- (b) At any time a ladder is suspected of being unsafe;
- (c) After the ladder has been subjected to overloading (see Table 3-1.1);
- (d) After the ladder has been subjected to impact loading or unusual conditions of use;
- (e) After heat exposure (see 5-1.9, 5-1.10, and 5-1.11);
- (f) After any deficiencies have been repaired unless the only repair was replacing the halyard;
- (g) Before the ladder is placed in service for the first time.

5-1.7.1 All ground ladders, except pompier ladders and folding ladders, shall be service tested as specified in Section 5-2 of this chapter.

5-1.7.2 Pompier ladders shall be service tested as specified in Section 5-3 of this chapter.

5-1.7.3 Folding ladders shall be service tested as specified in Section 5-5 of this chapter.

5-1.8 All service test results shall be permanently recorded. Minimum information recorded shall be as required in Table 5-1.8.

Table 5-1.8 Fire Department Ground Ladder Record

Manufacturer's Ladder Identification Number or Code _____	
Fire Department Identification (if different) _____	
Ground Ladder Manufacturer _____	
Fire Department Company Where Ground Ladder Is Assigned _____	
Date Purchased _____	
Date Placed in Service _____	
Type of Ground Ladder	
☐ Single	☐ Combination
☐ Roof	☐ Folding
☐ Extension	☐ Pompier
Ladder Construction	
☐ Wood	☐ Solid Beam
☐ Metal	☐ Truss Beam
☐ Fiberglass	
Heat Sensor Label Check	
Previous Repairs, Reason for Repair, and Date of Repair _____	
Type of Test, Test Date, and Person(s) Performing Test _____	
Reason for Test _____	
Test Results	
Horizontal Bending Test — Amount of Permanent Deformation _____	
☐ Passed	☐ Failed
Hardware Test	
☐ Passed	☐ Failed
Roof Hook Test	
☐ Passed	☐ Failed
Pompier Ladder Test	
☐ Passed	☐ Failed
Hardness Test — Readings for Each Test Point _____	
☐ Passed	☐ Failed
Liquid Penetrant Test — Location of Inspection and Results _____	
Repairs Needed _____	
Repairs Completed _____	
Person(s) Performing Repairs _____	
Date Completed _____	
Person Signing Record _____	

5-1.9 If the ground ladder does not meet all the requirements of this chapter, the ladder shall be removed from service and repaired for fire service use or destroyed.

5-1.10 Additional Requirements for Metal Ground Ladders Only.

5-1.10.1 Metal ground ladders shall be further tested as specified in Section 5-2, Strength Service Testing, of this chapter at least annually.

5-1.10.2 Whenever any metal ground ladder has been exposed or is suspected of having been exposed to direct flame contact, or whenever the heat sensor label has changed to indicate heat exposure, the ladder shall be service tested as specified in either Section 5-2, Strength Service Testing, or Section 5-4, Hardness Service Testing, of this chapter. Hardness service testing does not replace the need for load testing as outlined in 5-1.7 and 5-2.

5-1.11 Additional Requirements for Wood Ground Ladders Only. Whenever any wood ground ladder has been exposed or is suspected of having been exposed to direct flame contact, the ladder shall be service tested as specified in Section 5-2, Strength Service Testing, of this chapter.

5-1.12 Additional Requirements for Fiberglass Ground Ladders Only. Whenever any fiberglass ground ladder has been exposed or is suspected of having been exposed to direct flame contact, or whenever the heat sensor label has changed to indicate heat exposure, the ground ladder shall be service tested as specified in Section 5-2, Strength Service Testing, of this chapter.

5-2 Strength Service Testing Requirements for All Ladders Except Pompier and Folding Ladders.

5-2.1* Horizontal Bending Test. All ladders except pompier and folding ladders shall be strength service tested as required by 5-1.7 in accordance with the following provisions.

5-2.1.1 The ladder shall be positioned for testing and tested as shown in Figure 5-2.1. The ladder shall be placed in a flat horizontal position supported under the first rung from each end of the ladder. Extension and combination ladders shall be extended to their maximum extended length, with pawls engaged, for this test. The test load shall be applied equally to a center span covering 16 in. (406 mm) each side of the center inclusive. The test load shall be applied to a flat test surface resting on the beams in the center area. The test load shall consist of free weights in increments consistent with safety and ease of handling. All test loads shall include the weight of the test surface.

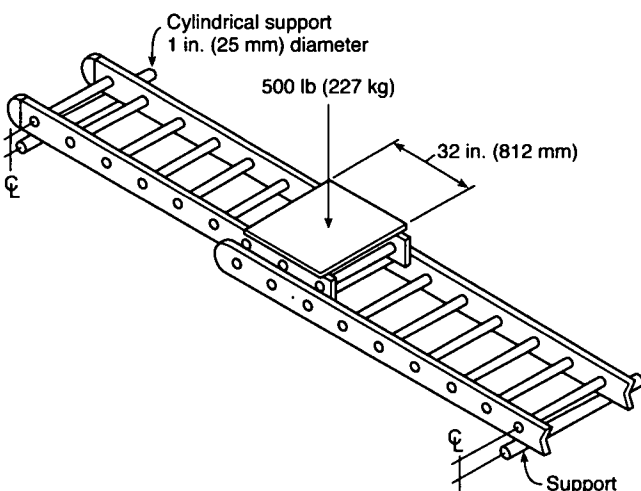


Figure 5-2.1 Extension ladder positioned for horizontal bending test.

5-2.1.2 Test Procedures for Metal and Fiberglass Ground Ladders Only.

5-2.1.2.1 Straps or other ties that do not increase the strength of the ladder may be used to ensure that the ladder locks remain engaged during the test.

5-2.1.2.2 The ladder shall be loaded with a pre-load of 350 lb (159 kg) applied equally to the center span covering 16 in. (406 mm) each side of the center inclusive. Caution shall be exercised whenever applying or removing the weights to minimize any impact loading. The load shall be allowed to remain for at least 1 min to "set" the ladder prior to completing the rest of the test.

5-2.1.2.3 After removing the pre-load, the distance between the bottom edge of each side rail and the surface upon which the ladder supports are placed shall be measured. All measurements shall be taken at a consistent location as near as practical to the center of the ladder.

5-2.1.2.4 The ladder shall be loaded with a test load of 500 lb (227 kg) applied equally to the center span covering 16 in. (406 mm) each side of the center inclusive. The test load shall remain in place for 5 min.

5-2.1.2.5 The test load shall then be removed and distance between the bottom of each side rail and surface upon which the ladder supports are placed shall be measured. Five minutes shall elapse before conducting this measurement after removing the test loads.

5-2.1.2.6 Differences in measurements taken in 5-2.1.2.3 and 5-2.1.2.5 shall not exceed that value shown in Table 5-2.1.2.6. Any ladder that does not meet this criterion shall be removed from fire service use and destroyed.

Table 5-2.1.2.6

Length of Ladder	Difference in Measurements
25 ft or less	1/2 in.
26 ft to 34 ft	1 in.
35 ft or over	1 1/2 in.

For SI units: 1 in. = 25.4 mm; 1 ft = 0.3048 m.

5-2.1.2.7 There shall be no visible permanent change or failure of any hardware.

5-2.1.3 Test Procedures for Wood Ground Ladders Only.

5-2.1.3.1 The ladder shall be loaded with a test load of 500 lb (227 kg) applied equally to a center span covering 16 in. (406 mm) each side of the center inclusive. The test load shall remain in place for 5 min and then be removed.

5-2.1.3.2 To pass the test, the ladder and all components shall not show ultimate failure. Any ladder that does not meet this criteria shall be removed from fire service use and destroyed.

5-2.2 Additional Requirements for Roof Ladders Only — Roof Hook Test.

5-2.2.1 The test methods depicted in this section represent the preferred methods to be followed in determining whether a ladder conforms to the requirements of this standard. Variations from the specific methods depicted in the various diagrams shall be acceptable provided such

alternate means provide equivalent results and comply with the intent of the applicable preferred test method.

5-2.2.2 The ladder shall be positioned for testing and tested as shown in Figure 5-2.2. The ladder shall be hung solely by the roof hooks, with the hooks supported only by the points of the hooks, in a vertical position from a fixture capable of supporting the entire test load and weight of the ladder. The ladder shall be secured in such a manner to retain the ladder in the test position to prevent injury to test personnel if the hooks fail during the test.

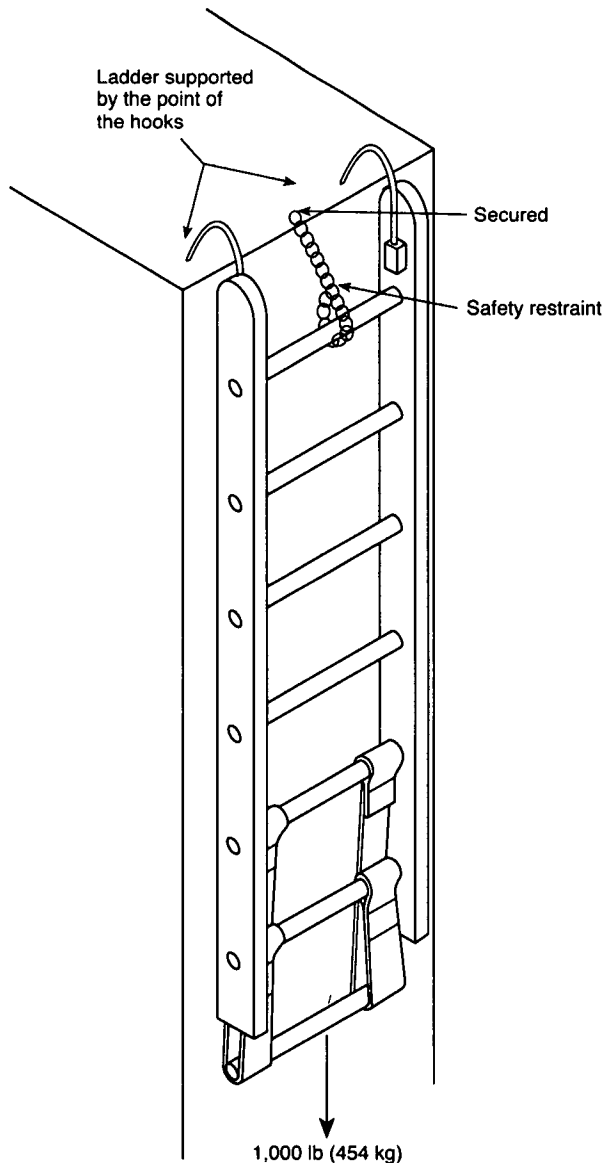


Figure 5-2.2 Roof ladder positioned for roof hook test.

5-2.2.3 A test load of 1,000 lb (454 kg) shall be placed over as many rungs as needed. The test load shall consist of weight increments consistent with safety and ease of handling.

5-2.2.4 Test load shall be applied for a minimum of 1 min.

5-2.2.5* After removal of the test load, there shall be no permanent deformation.

5-2.3 Additional Requirements for Extension Ladders Only — Hardware Test.

5-2.3.1 The test methods depicted in this section represent the preferred methods to be followed in determining whether a ladder conforms to the requirements of this standard. Variations from the specific methods depicted in the various diagrams shall be acceptable provided such alternate means provide equivalent results and comply with the intent of the applicable preferred test method.

5-2.3.2 The ladder shall be positioned for testing and tested as shown in Figure 5-2.3. The ladder shall be extended a minimum of one rung beyond the bedded position.

5-2.3.3 A test load of 1,000 lb (454 kg) shall be placed on the rungs of the fly section. The test load shall consist of weight increments consistent with safety and ease of handling.

5-2.3.4 Test load shall be applied for a minimum of 1 min.

5-2.3.5 Ladders shall sustain this test load with no permanent deformation or other visible weakening of the structure.

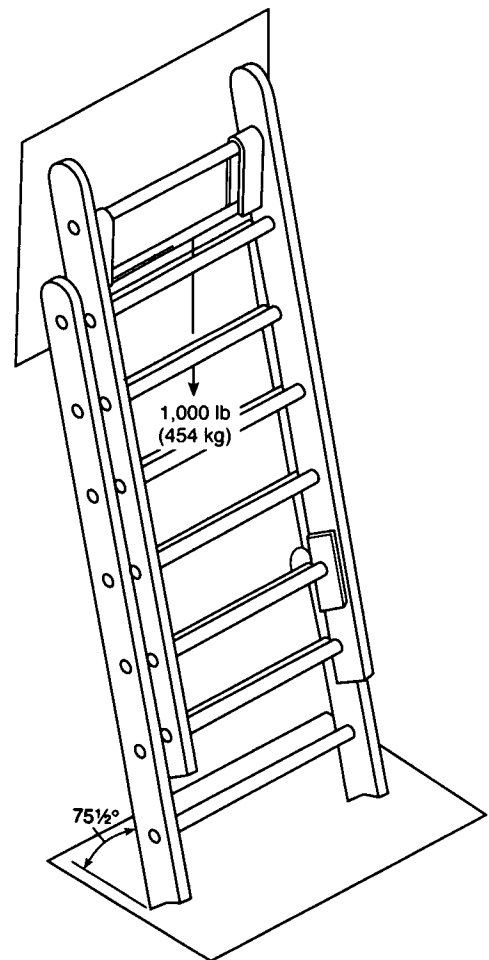


Figure 5-2.3 Extension ladder positioned for hardware test.

5-3 Strength Service Testing Requirements for Pompier Ladders Only.

5-3.1 The test methods depicted in this section represent the preferred methods to be followed in determining whether a ladder conforms to the requirements of this

standard. Variations from the specific methods depicted in the various diagrams shall be acceptable provided such alternate means provide equivalent results and comply with the intent of the applicable preferred test method.

5-3.2 The ladder shall be positioned for testing and tested as shown in Figure 5-3.2. The ladder shall be tested in the vertical hanging position supported only by its hook from a fixture capable of supporting the entire test load and weight of the ladder. The ladder shall be secured in such a manner to retain the ladder in the test position to prevent injury to test personnel if the hook fails during the test.

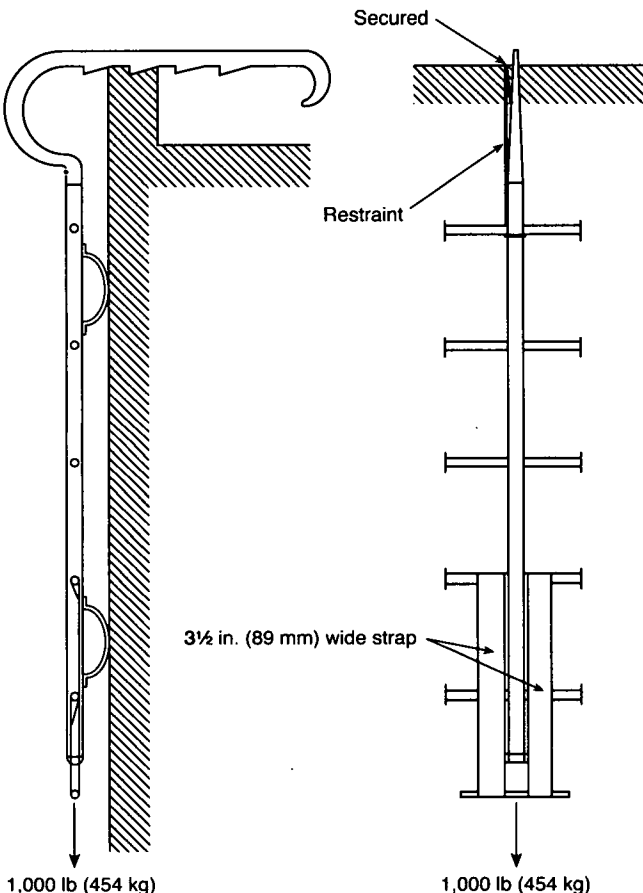


Figure 5-3.2 Pompier ladder positioned for test.

5-3.3 A test load of 1,000 lb (454 kg) shall be applied over multiple rungs.

5-3.4 The ladder shall withstand this test without ultimate failure. Any pompier ladder that does not meet this criteria shall be removed from fire service use and destroyed.

5-4* Hardness Service Testing Requirements for Metal Ground Ladders Only.

5-4.1 The testing criteria specified in this section shall apply ONLY to metal ground ladders constructed from 6061-T6 aluminum alloy. For other aluminum alloys or for other metals, the ladder manufacturer shall supply the hardness testing criteria.

5-4.2 The hardness service test shall be performed at a test point located between every rung on both beams. For

beams of truss construction, the test point shall be located on both the top chord and the bottom chord of the truss between every rung on both beams. One reading shall be taken at each test point.

5-4.3 The hardness testing device shall be calibrated immediately before testing and calibration verified immediately after testing in accordance with the manufacturer's requirements for that specific hardness testing device.

5-4.4 The reading obtained at each test point shall not be less than the value given for any of the hardness measuring scales specified in Table 5-4.4.

Table 5-4.4

Hardness Testing Scale	Minimum Reading
Barber Coleman	76
Brinell	80
Rockwell B	48
Rockwell E	84
Rockwell F	84
Rockwell H	103
Vickers	88

5-4.5 If a reading at a test point is less than the value given in Table 5-4.4 for the respective hardness testing scale, three readings shall be taken at that test point. The average of the three readings shall not be less than the value given in Table 5-4.5. No one reading of these three shall be less than the minimum value given in Table 5-4.5 for the respective hardness testing scale.

Table 5-4.5

Hardness Testing Scale	Average of 3 Readings Not Less Than	No One Reading at or Less Than
Barber Coleman	76	73
Brinell	80	71
Rockwell B	48	33
Rockwell E	84	79
Rockwell F	84	79
Rockwell H	103	100
Vickers	88	76

5-4.6 If the ladder does not meet the hardness service test requirements specified in 5-4.4 or 5-4.5 of this section, the ladder shall be removed from service and tested to the requirements of Section 5-2, Strength Service Testing, of this chapter.

5-5 Strength Service Testing Requirements for Folding Ladders Only.

5-5.1 Horizontal Bending Test.

5-5.1.1 The ladder shall be positioned for testing and tested similar to that shown in Figure 5-5.1. The ladder shall be placed in a flat horizontal position supported under the first rung from each end of the ladder. Folding ladders shall be in their unfolded configuration for this test. The test load shall be applied equally to a center span covering 8 in. (203 mm) on each side of the center inclusive. The test load shall be applied to a flat test surface resting on the beams in the center area. The test load shall consist of weight increments consistent with safety and ease of handling. All test loads shall include the weight of the test surface.

5-5.1.2 Test Procedures for Metal and Fiberglass Folding Ladders Only.

5-5.1.2.1 The ladder shall be loaded with a pre-load of 160 lb (73 kg) applied equally to the center span covering 8 in. (203 mm) on each side of the center inclusive. Caution shall be exercised whenever applying or removing the weights to minimize any impact loading. The load shall be allowed to remain for at least 1 min to "set" the ladder prior to completing the rest of the test.

5-5.1.2.2 After removing the pre-load, the distance between the bottom edge of each side rail and the surface upon which the ladder supports are placed shall be measured. All measurements shall be taken at a consistent location as near as practical to the center of the ladder.

5-5.1.2.3 The ladder shall be loaded with a test load of 225 lb (102 kg) applied equally to the center span covering 8 in. (203 mm) on each side of the center inclusive. The test load shall remain in place for 5 min.

5-5.1.2.4 The test load shall then be removed, and the distance between the bottom edge of each side rail and the surface upon which the ladder supports are placed shall be measured. Five min shall elapse before conducting this measurement after removing the test loads.

5-5.1.2.5 There shall be no more than $\frac{1}{2}$ in. (13 mm) difference between measurements taken in 5-5.1.2.2 and 5-5.1.2.4. Any ladder that does not meet this criterion shall be removed from fire service use and destroyed.

5-5.1.2.6 There shall be no visible permanent change or failure of any hardware.

5-5.1.3 Test Procedures for Wood Folding Ladders Only.

5-5.1.3.1 The ladder shall be loaded with a test load of 225 lb (102 kg) applied equally to a center span covering 8 in. (203 mm) on each side of the center inclusive. The test load shall remain in place for 5 min and then be removed.

5-5.1.3.2 To pass the test, the ladder and all components shall not show any permanent damage. Any ladder that does not meet this criterion shall be removed from fire service use and destroyed.

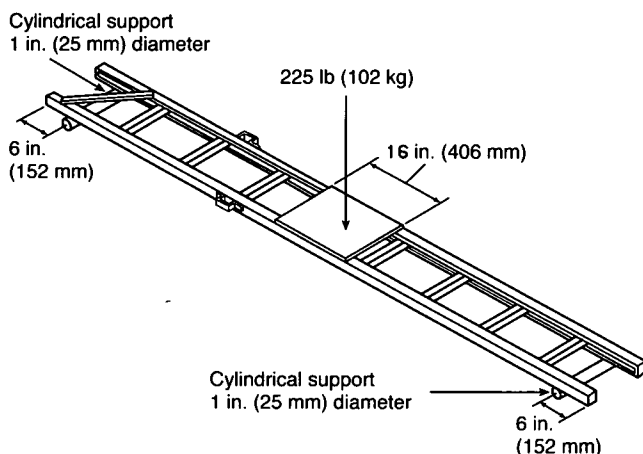


Figure 5-5.1 Folding ladder horizontal bending test.

Appendix A Explanatory Material

This Appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.

A-1-1.1 Ground ladders used in the fire service must be constructed to rigid standards of the highest quality. These ladders are often the only means of fire fighter entry into a building or portions of a building and may be the only means of egress for victims trapped by a fire within a building. Fire department ladders serve as a means of transporting people, equipment, and extinguishing agents from one area to another. Since the lives of the fire fighters and fire victims often rely on the performance without failure of these valuable pieces of fire department equipment, these standards of performance must be such that ladders can be used with the maximum of ease and assurance at all times.

A-1-1.2 Ladders used by fire department personnel solely in station maintenance, etc., and not transported, should be covered by the applicable ANSI and OSHA standards for the same.

The service testing procedures contained within this standard are based on the design criteria that are specified in NFPA 1931, *Standard on Design of and Design Verification Tests for Fire Department Ground Ladders*, 1994 edition. The 1984 edition of this standard included significant increases in the required strength of ladders, based on new information and technology that became available after the issuance of the 1979 edition of NFPA 1931. The new information relates to dynamic loads that result from actual use.

Ladders that were constructed to comply with earlier editions of NFPA 1931 were designed for lesser loads and less demanding test requirements that were the state of the art at that time. The new criteria are believed to be more accurate and provide a higher level of safety.

A-1-2 It is recognized that specific details on ladder construction materials have been established by other organizations such as the American National Standards Institute, U.S. Department of Agriculture Forest Products Laboratory, and the Aluminum Association. This standard should never be interpreted as establishing lower materials strength criteria than what may be set forth in other recognized standards such as these.

A-1-3 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations that is in a position to determine compliance with appropriate standards for the current production of listed items.

A-1-3 Authority Having Jurisdiction. The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau,

labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A-3-1.1 The design criteria for ladders assumes the weight of a fire fighter with protective clothing, SCBA, and equipment as 250 lb (113 kg). Ladders rated for 300 lb (136 kg) are designed for one person. Ladders rated for 750 lb (340 kg) are designed for a maximum of three persons on the ladder at any time. On a three-person ladder, not more than two should be grouped together, such as a rescuer and a victim.

It is the intent that the stress on the ladder structure and component parts or materials shall not exceed 25 percent of the yield strength of the structure, component parts, or materials when the ladder is statically loaded in accordance with Table 3-1.1.

A-3-1.8 Using a ladder at an angle of less than 70 degrees drastically increases the possibility of ladder slippage.

A-3-1.10 Using a ladder at angles less than 70 degrees drastically reduces the load-carrying capacity

A-3-2.3 Tying off or securing the halyard provides a secondary method of securing the fly section in the event of pawl disengagement. When a continuous halyard prevents tying off, a camlock as is used for securing a sailboat halyard might be used.

A-3-2.6 The use of one staypole introduces an artificial twist in the ladder that is dangerous to the climber and can cause permanent damage to the ladder.

A-3-4.1 Wood materials normally will not conduct electricity. However, under conditions of high voltage or moisture, surface contamination on the wood surface may conduct enough electricity to cause injury or death. Therefore, caution should be used around electrical wiring.

A-3-5.1 Fiberglass materials normally will not conduct electricity. However, under conditions of high voltage or moisture, surface contamination on the fiberglass surface may conduct enough electricity to cause injury or death. Therefore, caution should be used around electrical wiring.

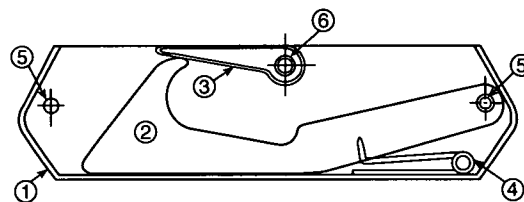
A-4-1.10.1 If a heat sensor label is present without an expiration date, contact the ladder manufacturer to determine when that heat sensor label should be replaced.

A-4-1.12.3 Continued exposure to a heating source or direct sunlight will cause wood ladders to deteriorate.

A-4-1.13.1 Continued exposure to direct sunlight will cause ultraviolet erosion of the surface of fiberglass ladders, causing the glass fibers to become exposed.

A-4-3.3 Pawl Housing Showing Parts.

When reinstalling ladder pawl assemblies use caution to prevent over-tightening of pawl assembly fasteners, as this will cause binding of pawl assembly parts. Replacement springs and parts are available from the ladder manufacturer.



- | | |
|---------------------------|------------------------|
| 1. Pawl housing | 4. Spring |
| 2. Pawl hook | 5. Mounting bolt holes |
| 3. Finger (note position) | 6. Shoulder bolt hole |

Figure A-4-3.3

A-4-3.5 Replacement halyards should not be less than $\frac{3}{8}$ in. (9.5 mm) in diameter with a minimum breaking strength of 825 lb (374 kg). They should be of sufficient length for the purpose intended and should not be spliced. Wire cable should have a 5 to 1 safety factor while supporting 2 times the dead load weight of the fly section(s) the cable is intended to raise.

A-5-1.2.1 Fire departments contracting with a testing organization for testing of aluminum ground ladders should require said testing firm to provide the following non-destructive testing. Interpretation of testing results from the following methods are highly critical and must be performed only by certified personnel. Testing agencies should provide, on request, certification documents stating that their personnel meet the American Society of Non-Destructive Testing (ASNT) requirements and that the personnel are proficient in maintaining certification in all methods and that refresher courses are administered as required in accordance with ASNT and company policies.

Hardness Testing.

Hardness testing is used to ensure proper evaluation of aluminum material in ground ladders. Hardness is the ability of a material to resist indentation or penetration. Tensile strength of a material is directly related to the hardness of a material. Hardness testing on ground ladders should be performed whenever there is question of annealing of the material due to exposure to heat.

Hardness testing should be conducted in accordance with the procedures defined in Section 5-4 of this standard.

Liquid Penetrant Testing.

Liquid penetrant testing primarily is used on fire department ground ladders formed of nonferromagnetic material (aluminum) to find discontinuities. Penetrant inspection is basically a very simple process. First, a liquid penetrant is applied to the surface. It is permitted to remain on the surface for a period of time during which it penetrates into any defect open at the surface. After the penetrating period, the excess penetrant remaining on the surface is removed. Then an absorbent light-colored powdered material called a developer is applied to the surface. This developer acts as a blotter and draws out a portion of the penetrant which has previously seeped into the surface opening. As the penetrant is drawn out, it diffuses into the coating of the developer, forming indications that are much wider than the surface opening with which they are associated. Liquid penetrant testing should be performed on all welds and areas of concern.

A-5-1.3 Wood ladders are particularly vulnerable to damage, and weakening may not be readily visible and may cause failure when used in emergency situations.

A-5-2.1 The horizontal bending test utilizes the horizontal position to make the testing procedure easier and safer. This position also provides a safety factor when compared to the same load at an angle of 75½ degrees. This safety factor is necessary to account for the dynamic forces that may be created by moving loads on the ladder as it is used (*see also A-1-1.2 and A-3-1.1*). This test is not designed to test a ladder for use as a bridge but rather to provide a test to ensure a safe ladder when it is used in the elevated position.

A brand new ladder has manufacturing tolerances that may give a false reading the first time the test is run. These false readings are less likely to occur on a ladder that has been in service and has been climbed prior to being tested. Therefore, a new ladder should either be set up and climbed several times prior to being tested, or the test should be run one time with the results not being counted and then repeated as the official test.

A-5-2.2.5 Many roof ladders manufactured prior to 1984 were equipped with mild steel roof hooks ⅝ in. (16 mm) in diameter that will not meet the requirements of the roof hook

test. Alloy steel (chrome-moly) roof hooks ⅝ in. (16 mm) in diameter or mild steel roof hooks ¾ in. (19 mm) in diameter normally will meet the roof hook test requirement.

A-5-4 The hardness service test may be used at any time to verify the hardness of the metal in the ladder but is only required as an option when there is an indication the ladder has been exposed to heat. (*See 5-1.10.2.*)

Appendix B Referenced Publications

B-1 The following document or portions thereof is referenced within this standard for informational purposes only and thus should not be considered part of the requirements of this document. The edition indicated for this reference is the current edition as of the date of the NFPA issuance of this document.

B-1.1 NFPA Publication. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 1931, *Standard on Design of and Design Verification Tests for Fire Department Ground Ladders*, 1994 edition.

Index

© 1994 National Fire Protection Association, All Rights Reserved.

The copyright in this index is separate and distinct from the copyright in the document which it indexes. The licensing provisions set forth for the document are not applicable to this index. This index may not be reproduced in whole or in part by any means without the express written permission of the National Fire Protection Association, Inc.

-A-

Angle of inclination 3-1.8, 3-1.10, A-3-1.8, A-3-1.10
 Definition 1-3
Approved (definition) 1-3, A-1-3
Authority having jurisdiction (definition) 1-3, A-1-3

-B-

Base (bed) section (definition) 1-3
Beams 3-1.12, 4-1.3(e), 4-1.12.2, 5-5.1.2.2
 Definition 1-3
Bedded position (definition) 1-3
Butt spurs 4-1.3(f)
 Definition 1-3
Butts 3-1.6
 Definition 1-3

-C-

Collapsible ladders *see* Folding ladders
Combination ladders
 Definition 1-3
 Service testing 5-2.1.1
Corrosion 4-1.3(j), 4-1.11

-D-

Damage, visible (definition) 1-3
Damaged ladders, removal from service of 3-1.3, 3-4.2, 3-5.3, 4-1.4
 After testing 5-1.3, 5-1.5, 5-1.9
 Testing A-5-1.3
Definitions 1-3, A-1-3

Deformation, permanent (definition) 1-3
Design criteria A-1-1.2, A-3-1.1
Design verification tests (definition) 1-3
Designated length (definition) 1-3
Dogs *see* Pawls
Duty rating 3-1.1
 Definition 1-3

-E-

Electrical hazards 3-3.1, 3-4.1, 3-5.1, A-3-4.1, A-3-5.1
Extension ladders
 Definition 1-3
 Inspection and maintenance 4-3, A-4-3.3, A-4-3.5
 Service testing 5-2.1.1, 5-2.3
 Use requirements 3-2, A-3-2.3, A-3-2.6

-F-

Failure *see also* Damaged ladders, removal from service of
 Test *see* Test failure
 Ultimate 4-1.4
 Definition 1-3
Fiberglass ground ladders
 Folding ladders, strength testing of 5-5.1.2
 Inspection and maintenance 4-1.3(l), 4-1.10.2, 4-1.13, A-4-1.13.1
 Service testing 5-1.12, 5-2.1.2, 5-5.1.2
 Use 3-5, A-3-5.1
Fire department ground ladders
 Definition 1-3
 Fiberglass *see* Fiberglass ground ladders
 In-service (definition) 1-3
 Inspection and maintenance Chap. 4, A-4

Metal *see* Metal ground ladders
 Mounting Chap. 2
 Securing base and top of 3-1.6 to 3-1.9, A-3-1.8
 Service testing Chap. 5, A-5
 Use of Chap. 3, A-3
 Wood *see* Wood ground ladders
Fly sections 3-2.1
 Definition 1-3
Folding ladders
 Definition 1-3
 Strength service testing 5-1.7.3, 5-5
Free weights 5-2.1.1
 Definition 1-3

-G-
Ground ladders *see* Fire department ground ladders

-H-
Halyards
 Definition 1-3
 Inspection 4-1.3(g)
 Replacement 4-3.5, A-4-3.5
 Use 3-2.3, A-3-2.3
Hardness test 5-4, A-5-1.2.1, A-5-4
Hardware test 5-2.3
Heat sensor labels
 Definition 1-3
 Inspection and maintenance 4-1.3(a), 4-1.10, A-4-1.10.1
 Use of 3-3.2, 3-5.2, 5-1.10.2, 5-1.12
Horizontal bending test 5-2.1, 5-5.1, A-5-2.1

-I-
In-service fire department ground ladders (definition) 1-3
Inside ladder width (definition) 1-3
Inspection and maintenance Chap. 4, A-4; *see also* Visual inspection
 Extension ladders 4-3
 Fiberglass ladders 4-1.13
 Heat sensor labels 4-1.10
 Metal ladders 4-1.11
 Roof ladders 4-2
 Wood ladders 4-1.12

-L-
Labels, heat sensor *see* Heat sensor labels
Ladder nesting (definition) 1-3
Ladders (definition) 1-3; *see also* Fire department ground ladders
Length
 Designated (definition) 1-3
 Maximum extended (definition) 1-3
 Working (definition) 1-3
Liquid penetrant test A-5-1.2.1
Loading ground ladders 3-1.1, A-3-1.1

-M-
Maintenance *see* Inspection and maintenance
Maximum extended length (definition) 1-3
May (definition) 1-3
Metal ground ladders
 Folding ladders, strength testing of 5-5.1.2
 Inspection and maintenance 4-1.10.2, 4-1.11
 Service testing 5-1.10, 5-2.1.2, A-5-1.2.1
 Folding ladders 5-5.1.2
 Hardness testing 5-4, A-5-4
 Use 3-3

Mounting ground ladders Chap. 2

-N-
Non-destructive tests (NDT) A-5-1.2.1
 Definition 1-3

-O-
Outside ladder width (definition) 1-3

-P-
Painting 4-1.7
Pawls 4-3.3, 5-2.1.1, A-4-3.3
 Definition 1-3
Permanent deformation (definition) 1-3
Pompier ladders
 Definition 1-3
 Strength service testing 5-1.7.2, 5-3
Purpose of standard 1-2, A-1-2

-R-
Referenced publications App. B
Rollers 4-1.9
Roof hooks 4-1.3(h), 4-2.2
 Test 5-2.2, A-5-2.2.5
Roof ladders
 Definition 1-3
 Inspection and maintenance 4-2
Rungs 4-1.3(b), (e), (i)
 Definition 1-3

-S-
Scaling ladders *see* Pompier ladders
Scope of standard 1-1, A-1-1.1 to A-1-1.2
Service tests Chap. 5, A-5
 Definition 1-3
 Hardness tests 5-4, A-5-4
 Hardware tests 5-2.3
 Horizontal bending tests 5-2.1, 5-5.1, A-5-2.1
 Records of tests 5-1.8
 Strength tests 5-2, A-5-2.1, A-5-2.2.5
 For folding ladders 5-5
Set (definition) 1-3
Shall (definition) 1-3
Should (definition) 1-3
Side rails *see* Beams
Single ladders (definition) 1-3
Staypoles 3-2.5 to 3-2.6, A-3-2.6
 Definition 1-3
Storage of ladders 4-1.6, 4-1.12.3, 4-1.13.1
Strength service testing 5-2, 5-3

-T-
Test failure 5-1.6, 5-2.1.2.6 to 5-2.1.2.7, 5-2.1.3.2, 5-5.1.2.5 to 5-5.1.2.6, A-5-1.3
 Definition 1-3
Tested (definition) 1-3
Tests *see* Service tests
Tormentors or tormentor poles *see* Staypoles

-U-
Ultimate failure 4-1.4; *see also* Damaged ladders, removal from service of
 Definition 1-3
Use of ground ladders Chap. 3, A-3

-V-

Visible damage (definition)	1-3
Visual inspection	4-1.2 to 4-1.4
Definition	1-3
Extension ladders	4-3.2
Roof ladders	4-2.2
Wood ladders	4-1.12

-W-

Width	
Inside ladder (definition)	1-3
Outside ladder (definition)	1-3
Wood ground ladders	
Folding ladders, strength testing of	5-5.1.3
Inspection and maintenance	4-1.3(l), 4-1.12, A-4-1.12.3
Service testing	5-1.11, 5-2.1.3, 5-5.1.3, A-5-1.3
Use	3-4, A-3-4.1
Working length (definition)	1-3

The NFPA Codes and Standards Development Process

Since 1896, one of the primary purposes of the NFPA has been to develop and update the standards covering all areas of fire safety.

Calls for Proposals

The code adoption process takes place twice each year and begins with a call for proposals from the public to amend existing codes and standards or to develop the content of new fire safety documents.

Report on Proposals

Upon receipt of public proposals, the technical committee members meet to review, consider, and act on the proposals. The public proposals – together with the committee action on each proposal and committee-generated proposals – are published in the NFPA's Report on Proposals (ROP). The ROP is then subject to public review and comment.

Report on Comments

These public comments are considered and acted upon by the appropriate technical committees. All public comments – together with the committee action on each comment – are published as the Committee's supplementary report in the NFPA's Report on Comments (ROC).

The committee's report and supplementary report are then presented for adoption and open debate at either of NFPA's semi-annual meetings held throughout the United States and Canada.

Association Action

The Association meeting may, subject to review and issuance by the NFPA Standards Council, (a) adopt a report as published, (b) adopt a report as amended, contingent upon subsequent approval by the committee, (c) return a report to committee for further study, and (d) return a portion of a report to committee.

Standards Council Action

The Standards Council will make a judgement on whether or not to issue an NFPA document based upon the entire record before the Council, including the vote taken at the Association meeting on the technical committee's report.

Voting Procedures

Voting at an NFPA Annual or Fall Meeting is restricted to members of record for 180 days prior to the opening of the first general session of the meeting, except that individuals who join the Association at an Annual or Fall Meeting are entitled to vote at the next Fall or Annual Meeting.

"Members" are defined by Article 3.2 of the Bylaws as individuals, firms, corporations, trade or professional associations, institutes, fire departments, fire brigades, and other public or private agencies desiring to advance the purposes of the Association. Each member shall have one vote in the affairs of the Association. Under Article 4.5 of the Bylaws, the vote of such a member shall be cast by that member individually or by an employee designated in writing by the member of record who has registered for the meeting. Such a designated person shall not be eligible to represent more than one voting privilege on each issue, nor cast more than one vote on each issue.

Any member who wishes to designate an employee to cast that member's vote at an Association meeting in place of that member must provide that employee with written authorization to represent the member at the meeting. The authorization must be on company letterhead signed by the member of record, with the membership number indicated, and the authorization must be recorded with the President of NFPA or his designee before the start of the opening general session of the Meeting. That employee, irrespective of his or her own personal membership status, shall be privileged to cast only one vote on each issue before the Association.

Sequence of Events Leading to Publication of an NFPA Committee Document

Call for proposals to amend existing document or for recommendations on new document.



Committee meets to act on proposals, to develop its own proposals, and to prepare its report.



Committee votes on proposals by letter ballot. If two-thirds approve, report goes forward.
Lacking two-thirds approval, report returns to committee.



Report is published for public review and comment. (Report on Proposals - ROP)



Committee meets to act on each public comment received.



Committee votes on comments by letter ballot. If two-thirds approve, supplementary report goes forward. Lacking two-thirds approval, supplementary report returns to committee.



Supplementary report is published for public review. (Report on Comments - ROC).



NFPA membership meets (Annual or Fall Meeting) and acts on committee report (ROP and ROC).



Committee votes on any amendments to report approved at NFPA Annual or Fall Meeting.



Complaints to Standards Council on Association action must be filed
within 20 days of the NFPA Annual or Fall Meeting.



Standards Council decides, based on all evidence, whether or not to issue standard
or to take other action, including hearing any complaints.



Appeals to Board of Directors on Standards Council action must be filed
within 20 days of Council action.

FORM FOR PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

Mail to: Secretary, Standards Council

National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02269-9101

Fax No. 617-770-3500

Note: All proposals must be received by 5:00 p.m. EST/EDST on the published proposal-closing date.

If you need further information on the standards-making process, please contact the
Standards Administration Department at 617-984-7249.

Date 9/18/93 Name John B. Smith Tel. No. 617-555-1212

Company _____

Street Address 9 Seattle St., Seattle, WA 02255

Please Indicate Organization Represented (if any) Fire Marshals Assn. of North America

1. a) NFPA Document Title National Fire Alarm Code NFPA No. & Year NFPA 72, 1993 ed.

b) Section/Paragraph 1-5.8.1 (Exception No.1)

2. Proposal recommends: (Check one)
- ☐ new text
☐ revised text
☒ deleted text

FOR OFFICE USE ONLY

Log # _____

Date Rec'd _____

3. Proposal (include proposed new or revised wording, or identification of wording to be deleted):

Delete exception.

4. Statement of Problem and Substantiation for Proposal: (Note: State the problem that will be resolved by your recommendation; give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

A properly installed and maintained system should be free of ground faults. The occurrence of one or more ground faults should be required to cause a "trouble" signal because it indicates a condition that could contribute to future malfunction of the system. Ground fault protection has been widely available on these systems for years and its cost is negligible. Requiring it on all systems will promote better installations, maintenance and reliability.

5. ☒ This Proposal is original material. (Note: Original material is considered to be the submitter's own idea based on or as a result of his/her own experience, thought, or research and, to the best of his/her knowledge, is not copied from another source.)

☐ This Proposal is not original material; its source (if known) is as follows: _____

Note 1: Type or print legibly in black ink.

Note 2: If supplementary material (photographs, diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee.

I hereby grant NFPA the non-exclusive, royalty-free rights, including non-exclusive, royalty-free rights in copyright, in this proposal and I understand that I acquire no rights in any publication of NFPA in which this proposal in this or another similar or analogous form is used.

John B. Smith
Signature (Required)

PLEASE USE SEPARATE FORM FOR EACH PROPOSAL