American National Standard for Ladders — Portable Metal — Safety Requirements
American National Standard for Ladders — Portable Metal — Safety Requirements

Secretariat
American Ladder Institute

Approved August 20, 2007
American National Standards Institute, Inc.

For information on possible errata sheets and other ANSI-ASC A14 Standards please refer to the ALI website located at:
www.americanladderinstitute.org
An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether they have approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no persons shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute.

Caution Notice: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Published by
American Ladder Institute
401 N. Michigan Avenue, Chicago, IL 60611

Copyright© 2007 by ANSI-ASC A14
All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Printed in the United States of America
Foreword

(This Foreword is not a part of American National Standard A14.2-2007.)

This standard on portable ladders is one of many American National Standards prepared under the supervision of the ANSI Accredited Standards Committee on Safety in the Construction, Care, and Use of Ladders, A14. Subcommittees that report to the American National Standards Committee A14 have developed all of the standards. The subcommittees are A14.1, Portable Wood Ladders; A14.2, Portable Metal Ladders; A14.3, Fixed Ladders, A14.4, Job-Made Ladders; and A14.5, Portable Reinforced Plastic Ladders, and 14.9, Ceiling Mounted Disappearing Climbing Systems.

All standards, except A14.7 Mobile Ladders Stands and Mobile Ladder Stand Platforms, derive from the original American National Standards Safety Code for Construction, Care, and Use of Ladders, which was first approved on July 25, 1923. Revisions were approved on April 11, 1935; April 2, 1948; and November 10, 1952.

The earlier editions contained some treatment of metal and fixed ladders. Requirements for these types were removed from the 1948 revision because rapid development in the metal ladder field warranted special consideration and treatment of metal ladders, and fixed ladders (usually metal) in separate standards.

The Metal Ladder Manufacturers Association is responsible for initiating the standard on portable metal ladders. This group prepared the original draft and submitted it to Standards Committee A14 for consideration in May 1951. Subcommittee A14.2 was then created to review the document and make any changes necessary to conform to the requirements of all the interested groups. After consideration and some revision by the subcommittee, nearly 200 copies of the draft were sent to various organizations and individuals for review and comment. The suggestions received were considered in the preparation of the final draft, which was submitted to the Standards Committee for letter ballot in December 1955, and approved in 1956. Subcommittee A14.2 also developed the 1972 edition.

Responding to a Consumer Product Safety Commission challenge in August 1975, the A14 Committee mounted a three-prong attack to upgrade the portable ladder standards within the consensus framework of developing standards. Three Task Forces — Anthropometric, Testing, and Labeling — were established in October 1975.

Without question the Testing Task Force carried out the most massive technically difficult task, which included a significant amount of human-factors work. Over 100 known ladder experts were solicited to join this task force and provide their technical expertise. The work involved 50 meetings, over 400 test documents and the use of numerous test ladders over a period of nearly two years. The cost of the project has been conservatively estimated at over $300,000.

At the August 11, 1977, joint meeting of the Testing Task Force and the A14 Advisory Committee, 23 procedures were presented. These procedures, with an accompanying rationale based upon statistical and human factors data, were distributed to the three portable-ladder subcommittees for review and incorporation into the standards. Recommendations for nomenclature, and for care and use of ladders had been previously balloted. In addition, the Ladder Use Survey Form and Bi-Level Fall Victim Report Form (that have been included in the Appendices), had also been balloted so the more technical material from the Testing Task Force could receive full attention of the three subcommittees.

Test procedures were developed for three different applications, namely, design verification, quality control, and in-service testing. Design verification tests would generally be conducted on a one-time basis during the original design development of the product and would usually be destructive tests. The manufacturer on an on-going basis would conduct quality control tests; some of the tests would be destructive and some would be nondestructive. In-service tests would be conducted by the user on a periodic basis and would be nondestructive in nature.
ANSI A14.2-1981 was approved March 4, 1980 with an effective date of March 4, 1982. This 2 year period was to allow the manufacturers the necessary lead time to evaluate their products for conformance to the 1981 edition of the three portable ladder standards, to redesign and test their products where applicable, to design and build the required manufacturing tooling and machinery, and to convert their manufacturing operations to produce the revised products.

During development of product for compliance with the 1981 revision, experience by some of the manufacturers indicated that the inclined load test was not practical when applied to all available length ladders. Also, recommendations were received for clarifications in test procedure descriptions. In the course of resolving these questions, evidence was produced to warrant modifications in the label test requirements and further investigations brought about changes in the label test specifications.

To allow time for investigating these issues, the effective date of the 1981 revision was postponed to June 4, 1982 and then to October 4, 1982. Once the issues were resolved, ANSI A14.2-1982 was approved with the needed changes incorporated and an effective date of October 4, 1982.

In the 1990 revision, several issues, which had arisen since the 1982 revision, were addressed. Most significantly, requirements were developed to cover the multipurpose articulated ladder. In addition the label/marking section improved the graphics as well as presented new labels.

Considerable effort went into preparing the 2000 revision to assure consistency between the A14.2 standard for portable metal ladders and the new revisions of A14.1 (portable wood ladders) and A14.5 (portable reinforced plastic ladders) standards.

In this current revision, several issues, which have arisen since the last revision, are addressed. As a result of efforts by an Articulated Ladder Task Force, additional dynamic testing has been added to the testing requirements for articulated ladders. Additionally, requirements for ladders with a 375 pound duty rating, designated as “Special Duty Type IAA” are now being incorporated within the ANSI A14.2 and A14.5 standards.

Requirements for Special Duty Type IAA ladders were previously developed and issued in the ANSI A14.10-2000 standard. The A14.10 subcommittee was originally formed in order to quickly respond to a petition to ANSI by cable TV and electric companies for a higher duty rating ladder. After incorporation of the Special Duty Type IAA requirements into the A14.2 and A14.5 standards, the A14.10 standard will be withdrawn.

Each revision of the 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 the committee members voted for its approval.

Suggestions for improvement of this standard are welcome. They should be sent to the American Ladder Institute, 401 N. Michigan Ave., Chicago, IL 60611.

At the time it approved this standard, the A14 Committee had the following members:

- Erick Knox, Chairman
- Don Gibson, Vice Chair
- Ron Pietrzak, Administrative Secretariat

<table>
<thead>
<tr>
<th>Organization Represented</th>
<th>Name of Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Insurance Association</td>
<td>George Earhart</td>
</tr>
<tr>
<td>American Ladder Institute</td>
<td>Marc McConnell</td>
</tr>
<tr>
<td>American Society of Safety Engineers</td>
<td>Earnest Harper</td>
</tr>
<tr>
<td>Associated General Contractors of America</td>
<td>Charles Bird</td>
</tr>
<tr>
<td>Canadian Standards Association</td>
<td>Walter Dick</td>
</tr>
<tr>
<td>Cosco Home and Office Products</td>
<td>Eric Kruse</td>
</tr>
<tr>
<td>Disappearing Attic Stairway Association</td>
<td>Dennis Williams</td>
</tr>
<tr>
<td></td>
<td>Brad Hudspeth (Alt)</td>
</tr>
</tbody>
</table>

iv
Illinois Association of Building Maintenance Contractors ................................................ Carl Pedersen
James Tomaseski
International Brotherhood of Electrical Workers ............................................................ James Weil (Alt)
International Brotherhood of Painters and Allied Trades ............................................. Dan Penski
Mike Metz (Alt)
International Union of Bricklayers & Allied Craftsmen ............................................... Anthony Kassman
Metal Ladder Manufacturers Association ................................................................. Dave Plotner
Dale King (Alt)
National Fire Protection Association ............................................................................. Samuel C. Cramer
Ronald Bennett (Alt)
National Frame Builders Association ........................................................................... Stan Virkler
Precision Ladders ......................................................................................................... Don McKinney
Steve Richey (Alt)
Risk Retention Services ............................................................................................... Paul B. Junius
Robert G. Stuligross (Alt)
Scaffold Industry Association ....................................................................................... Alan Kline (Alt)
Steel Plate Fabricators Association ............................................................................. Wallace Melvin
Underwriter's Laboratories ............................................................................................. Edgar Wolff-Klammer
U.S. Consumer Product Safety Commission ............................................................... Thomas Caton*
Mark E. Kumagai (Alt)*
U.S. Department of Labor OSHA ................................................................................ Virginia Fitzner*
Robert Bell (Alt)*
Independent Specialists .............................................................................................. Donald Bloswick
John E. Johnson
George H. Kyanka
Irving Ojalvo
Steven Cramer

*non-voting advisory member

Subcommittee A14-2 on portable ladders, which revised this standard, consists of the following members:
Erick Knox, Chairman D. Plotner
R. Bennett T. Schmitt
D. Gibson M. Silverman
J. E. Johnson M. VanBree
J. Krafchick K. Vidal
I. Ojalvo E. Wolff-Klammer
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Scope and Purpose</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Scope</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Purpose</td>
<td>1</td>
</tr>
<tr>
<td>2. General</td>
<td>1</td>
</tr>
<tr>
<td>2.1 Rationale</td>
<td>1</td>
</tr>
<tr>
<td>2.2 Application</td>
<td>1</td>
</tr>
<tr>
<td>2.3 Interpretation</td>
<td>2</td>
</tr>
<tr>
<td>2.4 Mandatory and Advisory Provisions</td>
<td>2</td>
</tr>
<tr>
<td>2.5 Equivalent</td>
<td>2</td>
</tr>
<tr>
<td>2.6 Effective Date</td>
<td>2</td>
</tr>
<tr>
<td>3. Related Standards</td>
<td>2</td>
</tr>
<tr>
<td>4. Definitions and Nomenclature</td>
<td>2</td>
</tr>
<tr>
<td>5. General Requirements</td>
<td>4</td>
</tr>
<tr>
<td>5.1 Flare</td>
<td>4</td>
</tr>
<tr>
<td>5.2 Side Rails</td>
<td>4</td>
</tr>
<tr>
<td>5.3 Rung and Step Spacing</td>
<td>4</td>
</tr>
<tr>
<td>5.4 Rung Connections</td>
<td>4</td>
</tr>
<tr>
<td>5.5 Rungs, Steps, and Platforms</td>
<td>4</td>
</tr>
<tr>
<td>5.6 Hardware</td>
<td>4</td>
</tr>
<tr>
<td>5.7 Burrs, Bolts, Rivets, and Welds</td>
<td>4</td>
</tr>
<tr>
<td>5.8 Angle of Inclination</td>
<td>4</td>
</tr>
<tr>
<td>5.9 Plastic Top Caps</td>
<td>4</td>
</tr>
<tr>
<td>6. Specifications</td>
<td>4</td>
</tr>
<tr>
<td>6.1 Stepladders</td>
<td>4</td>
</tr>
<tr>
<td>6.2 Single and Extension Ladders</td>
<td>5</td>
</tr>
<tr>
<td>6.3 Trestle (Double Front) and Extension Trestle Ladders</td>
<td>6</td>
</tr>
<tr>
<td>6.4 Platform Ladders</td>
<td>7</td>
</tr>
<tr>
<td>6.5 Combination Ladders</td>
<td>8</td>
</tr>
<tr>
<td>6.6 Step Stools (Ladder Type)</td>
<td>8</td>
</tr>
<tr>
<td>6.7 Articulated Ladders</td>
<td>9</td>
</tr>
<tr>
<td>7. Test Requirements</td>
<td>10</td>
</tr>
<tr>
<td>7.1 General</td>
<td>10</td>
</tr>
<tr>
<td>7.2 Combination Ladder Tests</td>
<td>11</td>
</tr>
<tr>
<td>7.3 Single, Extension, Combination, and Articulated Ladder Tests</td>
<td>11</td>
</tr>
<tr>
<td>7.4 Articulated Ladder Tests</td>
<td>31</td>
</tr>
</tbody>
</table>
7.5 Step, Trestle (Double Front), Extension Trestle, Platform, Combination, Articulated Ladder and Step Stool Tests ........ 40
7.6 Labeling Tests .................................................................................................................. 45
8. Selection, Care, and Use .................................................................................................. 45
8.1 General ............................................................................................................................... 45
8.2 Selection ........................................................................................................................... 47
8.3 Rules for Ladder Use ...................................................................................................... 48
8.4 Care .................................................................................................................................... 50
9. Labeling/Marking Requirements ....................................................................................... 51
9.1 General Requirements ..................................................................................................... 51
9.2 Product Data Information Markings ............................................................................... 51
9.3 Specific Labeling/Marking Requirements ..................................................................... 51
10. Revision of American National Standards Referred to in this Document ...................... 53

Tables
Table 1 Extension Ladder Size ............................................................................................... 6
Table 2 Minimum Required Overlap for Extension Ladders ...................................................... 6
Table 3 Minimum Required Extension Trestle Ladder Overlap .................................................. 7
Table 4 Combination Ladder Size .......................................................................................... 8
Table 5 Horizontal Bending Test Loads ................................................................................... 11
Table 6 Maximum Allowable Average Deflections for Horizontal Bending Test .................... 13
Table 7 Deflection Test Loads ................................................................................................ 14
Table 8 Deflections and Angles of Twist ................................................................................ 14
Table 9 Simulated In-Use Inclined Load Test ........................................................................ 14
Table 10 Hardware Tests ....................................................................................................... 18
Table 11 Step Bending, Rung Bending, Side-Rail Bending, Compression, and Shear Strength Tests ........................................................................................................ 23
Table 12 Rung Torque Tests .................................................................................................. 24
Table 13 Maximum Allowable Deflection for Side Way Test - Midspan Deflection of Lower Side Rail .................................................................................................................. 25
Table 14 Static Side-Rail Cantilever Bending Test Load ........................................................... 26
Table 15 Ladder Section Twist Test ....................................................................................... 29
Table 16 Foot Slip Test ............................................................................................................ 30
Table 17 Articulated Ladder Self-Supported Scaffold Test .................................................... 31
Table 18 Stability Test Loads .................................................................................................. 36
Table 19 Maximum Allowable Racking Deflection ................................................................ 38
Table 20 Static Cantilever Bending Test ................................................................................ 41
Table 21 Rail Torsion Test ..................................................................................................... 43
Table 22 Summary of Significant Accident Causes ................................................................. 46
Table 23 Ladder Size, Working Length, and Height ................................................................. 47

Figures
Figure 1 Horizontal Bending Test ........................................................................................... 12
Figure 2 Deflection Test ......................................................................................................... 15
Figure 3 Deflection Test Data Sheet ...................................................................................... 16
Figure 4 Inclined Load Test .................................................................................................. 17
Figure 5 Column and Hardware Load Test and Single Lock Load Test ................................ 17
Figure 6 Standard Loading Block ......................................................................................... 18
Figure 7 Lock Test ............................................................................................................... 19
Figure 8  Lock Tip Load Test ............................................................. 20
Figure 9  Cyclic Rung Lock Test Arrangement ......................................... 21
Figure 10  Rung Lock Testing Cycle ..................................................... 22
Figure 11  Rung Bending Test and Rung-to-Side-Rail Shear Strength Test .................. 22
Figure 12  Rung Torque Tests .............................................................. 24
Figure 13  Side Sway Test ................................................................. 26
Figure 14  Static Side-Rail Cantilever Bending Test .................................... 27
Figure 15  Side-Rail Cantilever Dynamic Drop Test ................................... 28
Figure 16  Ladder Twist Test (Single, Extension, or Articulated Ladders) .................. 29
Figure 17  Foot Slip Test ................................................................. 30
Figure 18  Scaffold Bending Strength Test .............................................. 32
Figure 19  Compression, Step Bending, Side-Rail Bending, and Step-to-Side-Rail Shear Tests .................. 34
Figure 20  Methods (Other Than Dead Weight) for Applying Test Loads ................. 35
Figure 21  Front, Side, and Rear Stability Tests ....................................... 37
Figure 22  Torsional Stability and Rail Torsion and Spreader Tests .................... 39
Figure 23  Racking Test ................................................................. 40
Figure 24  Rail Static Cantilever Test .................................................. 42
Figure 25  Dynamic Drop Test ............................................................ 43
Figure 26  Stepladder Slip Test ........................................................... 44

Appendixes
Appendix A Format of Design and Color for Primary Hazard Danger and Caution Labels/Markings ........... 55
Appendix B Format of Design and Color for the Safety First and Notice Labels/Markings ...................... 56
Appendix C Marking Classification ..................................................... 66
ANSI A14 Comment Form ................................................................. 67

Markings
Marking No. 00 – All Ladders ............................................................ 57
Marking No. 1 – Step, Platform and Combination Ladders .................................. 58
Marking No. 2 – Step, Trestle (Double Front) and Platform Ladders ....................... 58
Marking No. 3 – Step, Trestle (Double Front) and Combination Ladders .................. 58
Marking No. 4 – Step Ladders ................................................................ 59
Marking No. 5 – Extension, Combination, Articulating Ladders ............................. 59
Marking No. 6 – Extension, Extension Trestle, Combination and Articulating Ladders ............ 60
Marking No. 7, 8 – Extension, Extension Trestle and Combination Ladders ............... 60
Marking No. 9 – Extension Ladders ........................................................ 60
Marking No. 10 – Extension Ladders ..................................................... 61
Marking No. 11, 12 – Step Stools .......................................................... 61
Marking No. 13 – Trestle Ladder (Double Front Ladder), Extension Trestle .................... 62
Marking No. 14 – Trestle Ladder (Double Front Ladder) ..................................... 62
Marking No. 15 – Extension Trestle Ladder .............................................. 63
Marking No. 16, 17 – Combination Ladders .............................................. 63
Marking No. 18 – Platform Ladder ........................................................ 64
Marking No. 19, 20 – Articulated Ladder ................................................ 64
Marking No. 21, 22 – Articulated Ladder ................................................ 65
Marking No. 23 – All Ladders .............................................................. 65
Marking No. 24 – Step, Trestle, Platform Ladders ........................................ 66
American National Standard for Ladders —
Portable Metal — Safety Requirements

1. Scope and Purpose

1.1 Scope

This standard prescribes rules governing the safe construction, design, testing, care and use of portable metal ladders of various types and styles. Ladder Types included are:

<table>
<thead>
<tr>
<th>Duty Rating</th>
<th>Ladder Type</th>
<th>Working Load (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Duty</td>
<td>IAA</td>
<td>375</td>
</tr>
<tr>
<td>Extra Heavy-Duty</td>
<td>IA</td>
<td>300</td>
</tr>
<tr>
<td>Heavy-Duty</td>
<td>I</td>
<td>250</td>
</tr>
<tr>
<td>Medium-Duty</td>
<td>II</td>
<td>225</td>
</tr>
<tr>
<td>Light-Duty</td>
<td>III</td>
<td>200</td>
</tr>
</tbody>
</table>

Ladder styles include ladder type step stools, portable extension, step, trestle, sectional, combination, single, platform, and articulating ladders, but excluding ladders in and on mines, the fire services, mobile equipment, hoisting equipment, work platforms, antenna communications towers, transmission towers, utility poles, and chimneys. It does not cover special-purpose ladders that do not meet the general requirements of this standard, nor does it cover ladder accessories, including, but not limited to, ladder levelers, ladder stabilizers or stand-off devices, ladder jacks, or ladder straps or hooks, that may be installed on or used in conjunction with ladders.

Note: Ladder type step stools are covered by A14.2. It is recognized that a step stool standard is under development. When the step stool standard is approved, A14.2 will no longer cover ladder type step stools.

These requirements are also intended to prescribe rules and criteria for labeling/marking of the kinds of portable ladders cited in this standard, but exclusive of furniture type step stools and special purpose ladders. These labeling/marking requirements do not apply to those situations where training, supervision, or documented safety procedures would be in conflict, or serve in lieu of, these labeling/marking requirements.

1.2 Purpose

The purpose of this standard is to provide reasonable safety for life, limb, and property. In order to develop an effective safety program, the standard may serve also as a basis for purchase requirements and for instructions in personnel training, and in the preparation of motivational/instructional material such as safety practices, manuals, posters, and the like.

This standard is also intended to provide the manufacturer, purchaser, and user of metal ladders with a set of performance and dimensional requirements against which this product may be compared. It is not the purpose of this standard to specify all the details of construction of portable metal ladders. The limitations imposed are for the purpose of providing adequate general requirements and testing methods needed for consistency.

2. General

2.1 Rationale

A rationale has been developed covering the specifications and performance requirements of this standard.¹

2.2 Application

This standard is intended for voluntary use by establishments that use, manufacture or evaluate ladders. It is also designed to serve as a guide to federal and state authorities or other regulatory bodies in the formulation of laws or regulations.

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

¹The rationale is on file with the Secretariat. American Ladder Institute, 401 N. Michigan Avenue, Chicago, IL. 60611.