

ASME B107.55-2002
(Revision of ASME B107.55M-1998)

AXES: SAFETY REQUIREMENTS

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers



The American Society of
Mechanical Engineers

A N A M E R I C A N N A T I O N A L S T A N D A R D

AXES: SAFETY REQUIREMENTS

ASME B107.55-2002
(Revision of ASME B107.55M-1998)

Date of Issuance: October 15, 2002

This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda issued to this edition.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the ASME Web site under the Committee Pages at <http://www.asme.org/codes/> as they are issued.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not "approve," "rate," or "endorse" any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assume any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

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

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

Copyright © 2002 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All Rights Reserved
Printed in U.S.A.

CONTENTS

Foreword	iv
Committee Roster	v
Correspondence with B107 Committee	vi
1 General	1
2 Normative References	1
3 Definitions	1
4 General Requirements	3
5 Safety Requirements and Limitations of Use	5
Table	
1 Chemical Properties of Steel Ax Heads	4
Figures	
1 Ax Nomenclature	2
2 Typical Static Force Test	5

FOREWORD

The American National Standards Committee B107, Socket Wrenches and Drives, under sponsorship of The American Society of Mechanical Engineers (ASME), was reorganized as an ASME Standards Committee, and its title was changed to Hand Tools and Accessories. In 1996, the B209.7 Committee, which had published an earlier version of this Standard as B209.7, merged with the B107 Committee, and the B107 Committee scope was expanded to include safety considerations. This Standard was previously designated ANSI/HTI B173.4-1991.

The purpose of this Standard is to define essential performance and safety considerations specifically applicable to axes; to specify test methods to evaluate performance relating to the defined considerations; and to indicate limitations of safe use.

Members of the Hand Tools Institute (HTI) Striking and Struck Tools Standards Committee have been major contributors to the development of this Standard through their committee work, their knowledge of the products, and their active efforts in the promotion of the adoption of the Standard.

The format of this Standard is in accordance with *The ASME Codes & Standards Writing Guide 2000*. Requests for interpretations of the technical requirements of this Standard should be expressed in writing to the Secretary, B107 Committee, at the address below.

Suggestions for improvement of this Standard are welcome. They should be addressed to The American Society of Mechanical Engineers, Secretary, B107 Standards Committee, Three Park Avenue, New York, NY 10016-5990.

The requirements of this Standard become effective at the time of publication. ASME B107.55-2002 contains a revision of the hardness requirement in para. 4.3.2, and was approved as an American National Standard on May 13, 2002.

ASME STANDARDS COMMITTEE B107

Hand Tools and Accessories

(The following is the roster of the Committee at the time of approval of this Standard.)

OFFICERS

R. R. McCullough, *Chair*
G. E. Olson, *Vice Chair*
J. R. Bird, *Secretary*

COMMITTEE PERSONNEL

J. R. Bird, The American Society of Mechanical Engineers
J. Davidson, Sears Roebuck and Co.
J. S. Foote, Trade Association Management, Inc.
A. Herskovitz, Consultant
H. Kimball, Naval Air Warfare Center
R. R. McCullough, Consultant
D. S. McKittrick, Western Forge
G. E. Olson, Gene Olson Engineering Consultant Ltd.
W. T. Pagac, Snap-on, Inc.
D. M. Eggert, *Alternate*, Snap-on, Inc.
J. M. Ster, General Services Administration
I. I. Harding, *Alternate*, General Services Administration
R. B. Wright, Wright Tool Co.
W. C. Snyder, *Alternate*, Wright Tool Co.

SUBCOMMITTEE 4 — STRIKING AND STRUCK TOOLS

G. E. Olson, *Chair*, Gene Olson Engineering Consultant Ltd.
J. Combites, Vaughan & Bushnell
J. Davidson, Sears Roebuck and Co.
W. T. Pagac, Snap-on, Inc.

CORRESPONDENCE WITH THE B107 COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B107 Standards Committee
The American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Interpretations. Upon request, the B107 Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B107 Standards Committee.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings, which are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not “approve,” “certify,” “rate,” or “endorse” any item, construction, proprietary device, or activity.

Attending Committee Meetings. The B107 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B107 Standards Committee.

AXES: SAFETY REQUIREMENTS

1 GENERAL

1.1 Scope

This Standard provides safety requirements for the design, construction, testing, and use of axes that are intended specifically for use in felling, trimming, and pruning trees; splitting and cutting wood; notching and shaping logs and timbers; driving wooden or plastic stakes; pulling unhardened nails when the tool is provided with a nail slot; or digging when the particular tool is provided with a digging blade.

1.2 Purpose

This Standard is intended to serve as a guide in selecting, testing, and using the hand tools covered. Details of design, testing, and use of the tools covered are specified only as they relate to safety. It is not the purpose of this Standard to specify the details of manufacturing.

This Standard is also meant to serve as a guide in developing manuals and posters, and for training personnel to work safely.

1.3 Application

This Standard may be used as a guide by state authorities or other regulatory bodies in the formulation of laws or regulations. It is also intended for voluntary use by establishments that use or manufacture the tools covered.

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

1.4 Shall and Should

Mandatory requirements of this Standard are characterized by the word *shall*. If a provision is advisory in nature, it is indicated by the word *should* or is stated as a recommendation.

1.5 Equivalent

The word *equivalent* in this Standard shall be interpreted to mean alternative designs or features that will provide an equal degree of safety.

2 NORMATIVE REFERENCES

The following documents form a part of this Standard to the extent specified herein. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection; Supplement ANSI Z87.1a-1991

ANSI Z535.4-1991, Product Safety Signs and Labels
Publisher: American National Standards Institute, 25 West 43rd Street, New York, NY 10036

ASTM A 322-91, Standard Specification for Steel Bars, Alloy, Standard Grades

ASTM A 576-90b(1995), Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality

ASTM A 681-94, Standard Specification for Tool Steels Alloy

ASTM E 18-94, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

Publisher: American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428

Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care

Publisher: Hand Tools Institute, 25 North Broadway, Tarrytown, NY 10591

3 DEFINITIONS

For the purpose of this American National Standard, the following definitions apply (see Fig. 1 as applicable):

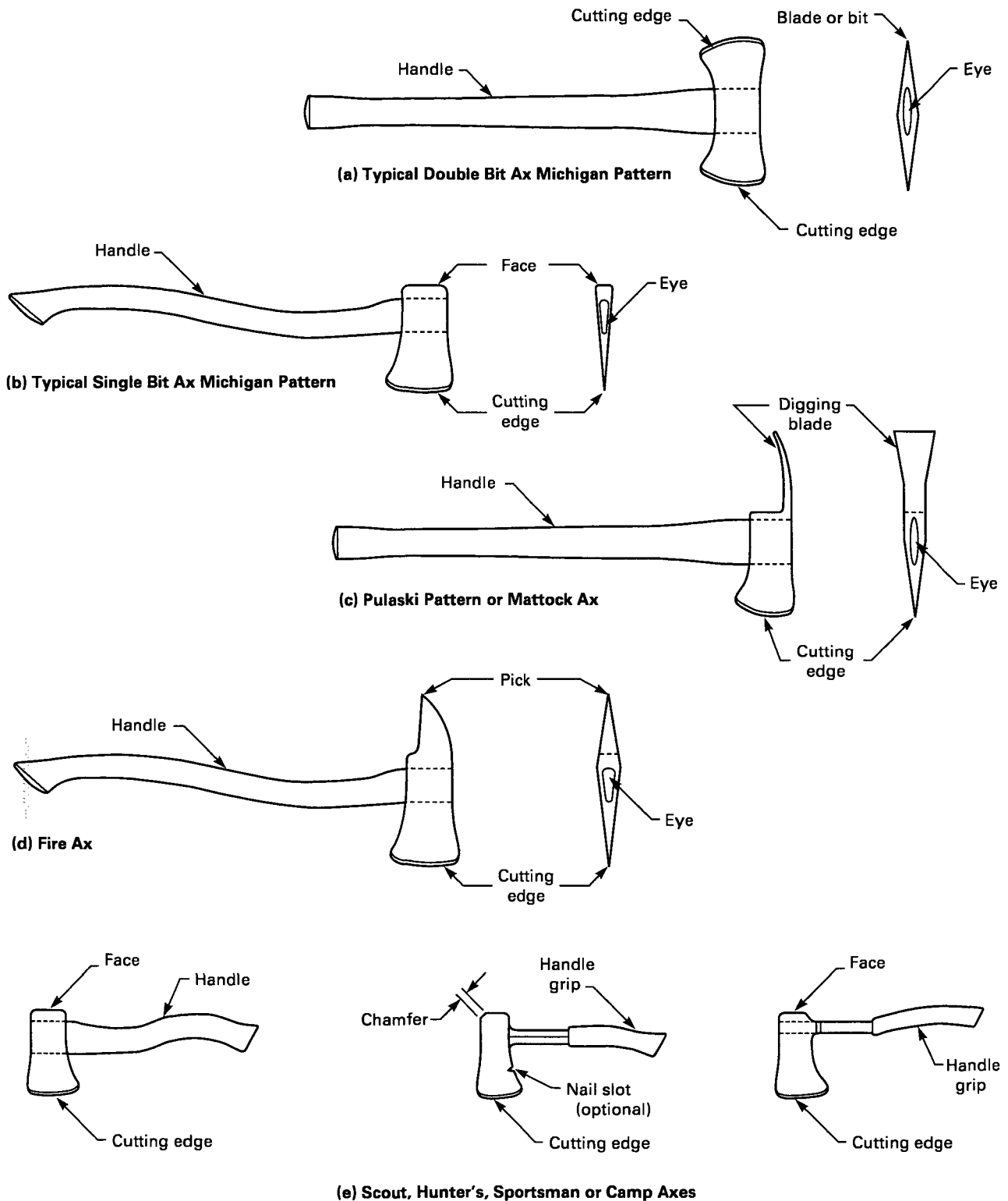


FIG. 1 AX NOMENCLATURE

bit (blade): the broad, tapering portion of the head that terminates in a sharpened cutting edge.

chamfer: the bevel or equivalent radius encircling the perimeter of the striking face.

cutting edge: the sharpened edge of the bit.

digging blade: the portion of the Pulaski Pattern or Mattock ax head directly opposite the bit, positioned at right angles to the handle axis, and terminating in a sharpened edge (when provided).

eye: an opening or aperture located between the bit and the face into which the handle is inserted, if the handle is separate.

face: the flat portion of the head directly opposite the bit (when provided).

handle: the portion that protrudes from the head and by which the ax is held.

handle grip: material securely attached to the grip end of ax handles (when provided).

hardness: the condition of the ax head resulting from heat treatment.

nail slot: the V-shape opening in one noncutting edge of the bit (when provided).

pick: the pointed portion of the fire ax head directly opposite the bit.

safety message: the information intended to promote safety that is imprinted on or affixed to the ax.

4 GENERAL REQUIREMENTS

4.1 Design

Typical styles of axes are described in this Section and are shown in Fig. 1. The names given in Fig. 1 are those generally recognized; the styles covered by this Standard, however, are not limited to those named or illustrated.

4.1.1 A double bit ax shall have two bits directly opposite each other with the cutting edges running parallel to the handle length. Each bit shall have a taper from the eye section terminating in cutting edges sharpened and ready for use in cutting, notching, splitting, shaping, and trimming wood or wood products.

4.1.2 A single bit ax shall have a bit on one end of the head and a directly opposed face on the other end, both running parallel to the handle length. The

bit shall have a taper from the eye section terminating in a cutting edge sharpened and ready for use in cutting, notching, splitting, shaping, and trimming wood or wood products.

The face may be a flat or slightly convex surface for use in driving wooden or plastic stakes. Chamfering of the face is acceptable but not required.

A nail slot in the bit is acceptable but not required. If provided, it shall be suitable for pulling unhardened nails.

4.1.3 A fire ax shall have a bit on one end of the head with a cutting edge running parallel to the handle length and a pick on the opposite end. The bit shall have a taper from the eye section terminating in a cutting edge sharpened and ready for use in cutting wood or similar materials. The pick shall have a gradually reducing cross section terminating in a sharp point and ready for use in breaking and dismantling wood or similar materials.

4.1.4 A Pulaski Pattern or Mattock ax shall have a bit on one end of the head with a cutting edge running parallel to the handle length and a digging blade on the opposite end with its edge running at right angles to the handle. The bit shall have a taper from the eye section that terminates in a cutting edge sharpened and ready for use in cutting, notching, splitting, shaping, and trimming wood or wood products. The digging blade shall have a flare from the eye, gradually increasing in width and terminating in a cutting edge sharpened and ready for use in cutting roots and digging fire lanes.

4.1.5 Handles shall be of any design, including ergonomic, that will withstand the tests specified in paras. 4.4.3 and 4.4.5.

4.1.6 The ax head and handle shall be free of non-functional sharp edges, points, and surface roughness that could inflict personal injury on the user when handling the ax.

4.2 Materials

4.2.1 Ax heads shall be made from special-quality, fine-grain, hot-rolled carbon steel bars conforming to the chemical requirements specified in Table 1 and to ASTM A 576. Equivalent material, such as alloy steel in conformance with ASTM A 322 or ASTM A 681, may also be used.

4.2.2 Ax heads shall be free of manufacturing and material defects such as seams, laps, pipes, and cold shuts that would jeopardize sound construction. They

TABLE 1 CHEMICAL PROPERTIES OF STEEL AX HEADS

Required Percentage of Element		
Element	Minimum	Maximum
Carbon	0.45	1.03
Manganese	0.30	1.20
Phosphorus	...	0.04
Sulfur	...	0.05
Silicon	...	0.35

shall conform to the requirements for mechanical properties specified in para. 4.3, and shall withstand the striking test specified in para. 4.4.3.

4.2.3 Handles shall be made of any suitable material that will withstand the tests specified in paras. 4.4.3 and 4.4.5.

4.3 Mechanical Properties

4.3.1 All bits, picks, or digging blades shall be hardened and tempered to a hardness of not less than 45HRC or equivalent, nor more than 60HRC or equivalent, for a distance of not less than 0.50 in. (12.7 mm) from the point or edge. The steel directly behind the bit, pick, or digging blade shall be a toughened supporting core that gradually decreases in hardness.

4.3.2 The face of the head shall have a hardness of not more than 60HRC or equivalent. The steel directly behind the face shall be a toughened supporting core.

4.3.3 The hardness of the eye section of the head shall not exceed a hardness of 40HRC or equivalent.

4.3.4 Bits, picks, or digging blades shall not chip, crack, fracture, or deform when subjected to the tests specified in paras. 4.4.3 and 4.4.4.

4.3.5 Handles shall not loosen or separate from the head, crack, or break when subjected to the tests specified in paras. 4.4.3 and 4.4.5.

4.4 Tests

Many tests required herein are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

4.4.1 General. Axes shall be capable of meeting tests specified in paras. 4.4.2 through 4.4.5. Separate (new) samples shall be used for each of the tests. Failure

to meet the requirements of any one of the tests indicates that the axes are not in compliance with this Standard.

4.4.2 Hardness Determination Test. Hardness determination with respect to faces, eye sections, bits, picks, and digging blades shall be made on a fixtured ax or suitable mounted or unmounted specimen that has been cut from the tool using the wet abrasive or other equivalent method. Any hardness test that uses equipment and methods equivalent to Rockwell hardness determinations, as specified in ASTM E 18, will be acceptable.

4.4.3 Striking and Tensile Force Test. Prior to tensile force testing, sample axes shall be subjected to the following striking test:

The sample ax shall receive twenty swinging, continuous hard striking blows by a person of average build, 160 to 180 lb (73 to 82 kg), or the mechanical equivalent, commensurate with the end use and weight of the ax, against hard wood material that is rigidly supported.

Following the striking test, assemblies consisting of two or more separate parts (head and handle) shall not loosen or separate when subjected to a static tensile force of 1000 lbf (4448 N).

4.4.4 Impact Test. The bits of the sample heads shall not fracture or deform when subjected to two hard blows with a 3.5 or 4 lb (1.6 or 1.8 kg) wooden mallet on each side of that portion of the bit that overhangs the edge of a bench or other flat support while the following conditions are met:

(a) the ax head is held flat on the bench with the bit from the lower portion of the eye overhanging the edge of the bench; and

(b) the remainder of the head is mechanically held on the bench.

4.4.5 Static Force Test. Samples of the assembled ax handles shall not break, loosen, or otherwise fail when subjected to a 110 lbf (490 N) load or static force while the following conditions are met:

(a) the ax head is locked securely in the test fixture with the bit down and the handle extended in the horizontal plane; and

(b) a static force of 110 lbf (490 N) is applied vertically at a point on the handle measuring 3 in. (76 mm) from the grip end of the handle. (See Fig. 2.)

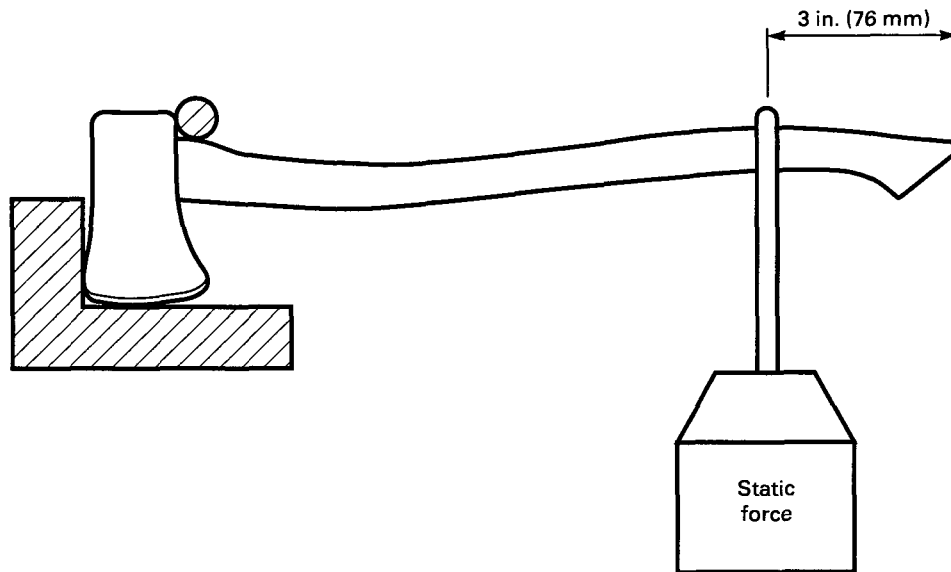


FIG. 2 TYPICAL STATIC FORCE TEST

5 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

5.1

Axes are special-purpose tools designed and intended only for the specific purpose of cutting wood and other equally soft materials. When a face is provided, it is intended only for striking wood or other equally soft materials, such as plastic.¹

5.2

To avoid possible eye or other bodily injury, axes shall be used only for the purposes specified in para. 1.1.

5.3

To avoid injury from possible flying objects, safety goggles or equivalent eye protection conforming to ANSI Z87.1 shall be worn by the user and by all persons in the immediate area in which any ax or other striking tool is being used.

5.4

The sides of the ax head shall not be used for striking or pounding.

5.5

When nail slots are provided, they should be used only for pulling unhardened nails.

5.6

An ax shall not be used as a maul or splitting wedge. It shall not be struck by another striking tool.

5.7

The ax heads shall be inspected prior to each use and their use discontinued at the first sign of chipping, mushrooming, or cracking of any portion.

5.8

No part of the ax head shall be ground, welded, treated by reheating, or otherwise altered from the original condition as furnished by the manufacturer, except that the ax may be properly resharpened (see para. 5.9).

5.9

When required, the cutting edge or edges should be resharpened, either with a fine whetstone or by hand filing with a fine file to prevent deep scratching. Care should be taken to maintain the original convex shape of the blade. All filing or whetstone scratches should run at right angles to the handle direction and should

¹ Plastic felling wedges are commonly used in the logging industry.

be refined or removed by honing. (See redressing instructions as outlined in the publication *Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care*.)

5.10

Handles shall be inspected prior to each use and those that are damaged shall be replaced. Replacements shall withstand the test requirements in paras. 4.4.3 and 4.4.5 and shall be equivalent to the original handle in size and quality. Handles of tools shall be free of splinters or cracks and shall be kept tight in the head of the tool.

5.11

When provided, handle grips that have loosened from the handle shall be tightened or replaced.

5.12

Instructors, employers, or both shall stress safety and the proper use of axes. They shall emphasize the necessity for and ensure the wearing of safety goggles or equivalent eye protection. The publication *Guide to*

Hand Tools — Selection, Safety Tips, Proper Use and Care provides guidelines for safe use of these tools.

5.13

Each ax shall be stamped, labeled, or otherwise marked by the manufacturer with the following safety message or equivalent safety message:



WARNING
WEAR SAFETY GOGGLES
USER AND BYSTANDER

This tool can be made to chip if struck against a hardened nail or other hard object. Use this hammer to drive and pull common nails only. Flying chips can result in eye or other bodily injury.

This safety message shall be located in a position that will not interfere with the quality or performance of the tool.

The above safety message shall also appear on replacement handles.

The principles set forth in ANSI Z535.4 shall be used as the guide for alternate, equivalent methods of labeling.

ISBN 0-7918-2788-7



9 780791 827888



N15002