

ASME B107.47M-1998

METAL CHISELS: SAFETY REQUIREMENTS

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers



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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

METAL CHISELS: SAFETY REQUIREMENTS

ASME B107.47M-1998

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FOREWORD

(This Foreword is not part of ASME B107.47M-1998.)

The American National Standards Committee B107, Socket Wrenches and Drives, under sponsorship of The American Society of Mechanical Engineers, held its organizational meeting on June 28, 1967. Subsequently, the Committee was reorganized as an ASME Standards Committee and its title was changed to Hand Tools and Accessories.

The development of this Standard was initiated by the Striking and Struck Tools Standards Committee, consisting of technical representatives of manufacturer members of the Hand Tools Institute (HTI).

The scope of this Standard is limited to the essential safety considerations specifically applicable to metal chisels.

This Standard was previously designated ANSI/HTI B209.1-1991.

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

This Standard was approved as an American National Standard on July 16, 1998.

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Secretary, B107 Standards Committee
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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.

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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.

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METAL CHISELS: SAFETY REQUIREMENTS

1 GENERAL

1.1 Scope

This Standard provides safety requirements for the design, construction, testing, and use of hand-held and handled metal chisels that are intended specifically for use in cutting and shaping metal objects. Some types of chisels included are cape, cold, concave, splitting, diamond point, and half-round. Power-driven chisels are excluded.

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 in safe practices.

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 of an advisory 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 edition 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, 11 West 42nd Street, New York, NY 10036

ASTM A 29/A 29M-93a, Standard Specification for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished, General Requirements for

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

ASTM A 331-95, Standard Specification for Steel Bars, Alloy, Cold-Finished

ASTM A 576-90b (Reapproved 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 19428-2959

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

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

3 DEFINITIONS (See Figs. 1 and 2 as Applicable)

For the purpose of this American National Standard, the following definitions apply.

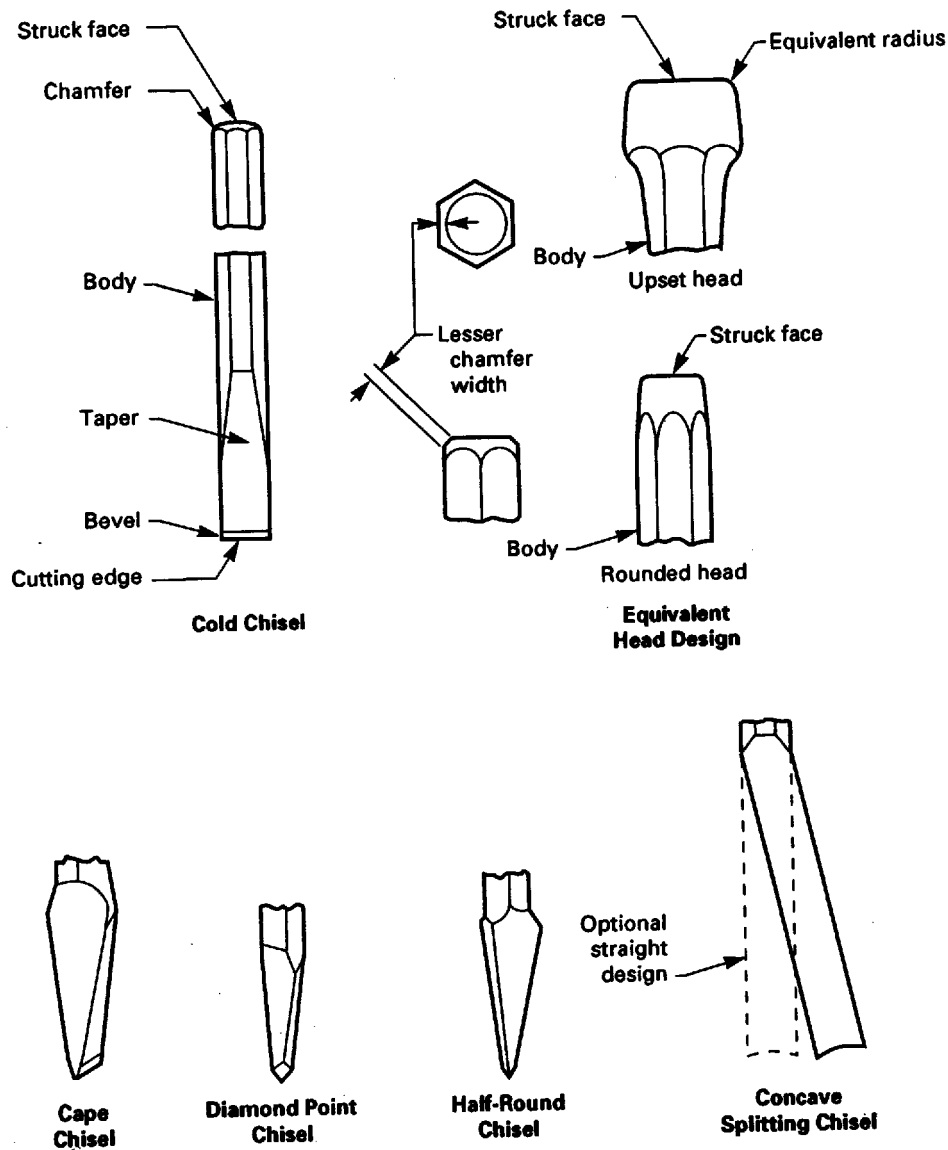


FIG. 1 NOMENCLATURE FOR HAND-HELD CHISELS

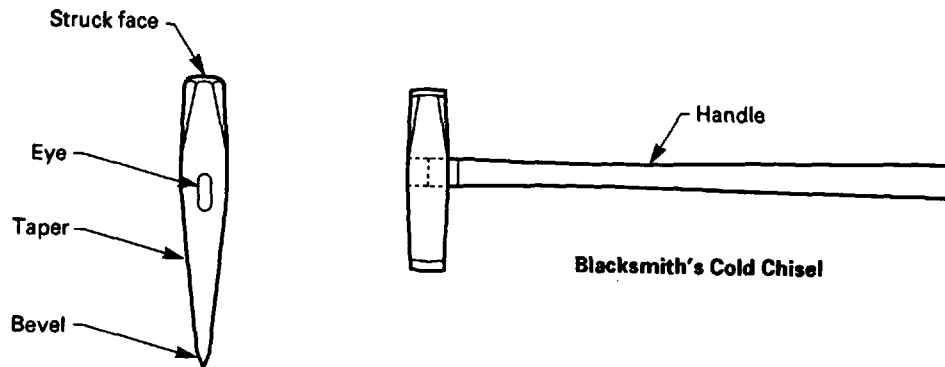


FIG. 2 NOMENCLATURE FOR HANDLED CHISELS

bevel: the angular portion of the chisel adjacent to the cutting edge extending to the taper.

body: the straight portion of the chisel between the chamfer and the taper.

chamfer: the angled flat surface or equivalent radius between the struck face and the body of the chisel encircling the perimeter of the struck face.

cutting edge: the edge formed by the bevel directly opposite the struck face.

eye: an opening or aperture located in the body of the chisel into which a handle is inserted (in those chisels designed for handles).

hand-held chisel: a chisel intended to be held by its body.

handle: the portion protruding from the chisel body by which the tool is held (in those chisels designed for handles).

hardness: the condition of the chisel resulting from heat treatment.

rounded head: an equivalent design for the struck face and chamfer portion of the chisel.

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

struck face: the portion of the chisel exclusive of the chamfer and body, directly opposite the cutting edge.

taper: the portion of the chisel between the body and the bevel with a gradually reducing cross-sectional area.

upset head: the portion of the chisel body having an enlarged cross-sectional area at the struck end of the tool, including and underlying the struck face.

4 GENERAL REQUIREMENTS

4.1 Design

Chisels shall have a cutting edge at one end for cutting, shaping, and removing metals softer than the cutting edge itself such as cast iron, wrought iron, steel, bronze, copper, and the like and shall have a struck face on the opposite end to be struck by a ball peen, hand drilling, or engineer's hammer of the appropriate size. The appropriate hammer shall have a striking face approximately 0.375 in. (9.53 mm) larger than the diameter of the struck face of the chisel.

Various typical styles of metal chisels and their usage are listed here. These styles are shown in Figs. 1 and 2. The names given in this Standard are those generally recognized. The styles covered by this Standard are not limited to those named or illustrated.

cape chisel: for cutting grooves and keyways.

cold chisel: for general-purpose cutting and shaping.

concave splitting chisel: for splitting bushings, mufflers, and tailpipes.

diamond point chisel: for cutting V-grooves, inside corners, and square holes.

half-round chisel: for cutting grooves.

4.1.1 The struck face of chisels shall have a convex shape or flat surface.

4.1.2 The struck face shall have a chamfer of approximately 45 deg or equivalent radius all around the perimeter and the lesser width (see Fig. 1) shall be equal to approximately one-tenth the body stock size. For example, if the body stock size equals 1 in.

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(25.4 mm), then the lesser chamfer width (see Fig. 1) will equal approximately 0.10 in. (2.5 mm).

4.1.3 Handles may be of any design and shall be inserted securely into the chisel and shall permit the chisel to be held over the work without exposing the user to personal injury. Handles shall withstand the test specified in para. 4.4.4.

4.1.4 All chisels and handles shall be free of nonfunctional sharp edges, points, and surface roughness that could inflict personal injury to the user when handling the tool.

4.2 Materials

4.2.1 Chisels shall be made from special-quality, fine grain, hot-rolled or cold-finished carbon or alloy steel, or from an equivalent material, having good wear-resisting and shock-resisting qualities and conforming to any of the following standards: ASTM A 29/A 29M, ASTM A 322, ASTM A 331, ASTM A 576, or ASTM A 681.

4.2.2 Chisels shall be free of manufacturing and material defects such as seams, laps, pipes, and cold shuts that would jeopardize sound construction. Chisels shall conform to the requirements for mechanical properties specified in para. 4.3, and shall withstand the tests specified in paras. 4.4.2 and 4.4.3.

4.2.3 Handles shall be of any suitable material that will withstand the test requirements in para. 4.4.4.

4.3 Mechanical properties

4.3.1 Chisels shall be hardened and tempered to not less than 53HRC or equivalent nor more than 60HRC or equivalent for a distance of not less than 0.25 in. (6.4 mm) from the cutting edge.

4.3.2 The hardness of the struck face of the chisel shall not exceed 45HRC or equivalent.

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. Metal chisels shall be capable of meeting tests specified in paras. 4.4.2 through 4.4.4. Separate (new) chisels shall be used for each of the tests. Failure to meet the requirements of any one of

the tests indicates the chisels are not in compliance with this Standard.

4.4.2 Hardness Determination Test. Hardness determination with respect to cutting edges and struck faces shall be made on a fixtured tool or on a suitable mounted or unmounted specimen that has been cut from the tool using the wet abrasive or other equivalent method. Any hardness test will be acceptable that utilizes equipment and methods equivalent to Rockwell hardness determination as specified in ASTM E 18.

4.4.3 Impact Test. Tests conducted in accordance with paras. 4.4.3.1 through 4.4.3.3 shall result in no chipping or spalling of the cutting edge or struck face. The chisel body and taper shall not exhibit cracking or bending. Normal deformation at either end is permitted.¹

The chisel shall be mounted vertically with the cutting edge centered on a steel bar and oriented 90 deg to the bar's longitudinal axis. The steel bar shall rest on a rigidly supported steel block weighing not less than 200 lb (91 kg) with a minimum hardness of 35HRC or equivalent. The specified weight shall have a striking face hardness of 45HRC or equivalent to 60HRC or equivalent and shall be dropped squarely onto the chisel's struck face. The weight's striking face diameter shall not be less than 0.375 in. (9.53 mm) larger than the struck face of the chisel. The steel bar shall be moved after each drop of the weight to make a new impression. Typically the weight is cylindrical and is dropped through a seamless tube slightly larger than the diameter of the weight.

4.4.3.1 Test for Cape, Cold, and Concave Splitting Chisels. The steel bar shall be a rod with a diameter of 0.25 in. (6.4 mm) made of AISI O1² steel uniformly hardened to 33HRC to 35HRC or equivalent.

A weight of 10 lb (4.5 kg) shall be dropped 20 times from the height indicated below:

Cutting Edge Width, in. (mm)	Drop Height, in. (mm)
0.25 (6.4) up to but not including 0.375 (9.53)	6 (152)
0.375 (9.53) up to but not including 0.56 (14.3)	20 (508)
0.56 (14.3) and over	30 (762)

¹ The impact test is so severe that a degree of permissible deformation such as the denting of the cutting edge and the struck face can be anticipated. A much less severe test would avoid this, but it would not provide the level of safety assurance desired.

² For further information about AISI designations, contact Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086.

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4.4.3.2 Test for Half-Round and Diamond Point Chisels. The steel bar shall be rectangular or square grade 1018-1030 (UNSG10180-G10300) with a uniform hardness of 80HRB to 85HRB. The thickness shall be a minimum of 0.75 in. (19.1 mm) and the width at least 0.25 in. (6.4 mm) greater than the cutting edge of the chisel.

A weight of 5 lb (2.3 kg) shall be dropped 10 times from a height of 10 in. (254 mm).

4.4.3.3 Test for Blacksmith's Cold Chisel. The steel bar shall be rectangular or square with a uniform hardness of 25HRC to 30HRC or equivalent. The thickness shall be a minimum of 0.75 in. (19.1 mm) and the width at least 0.25 in. (6.4 mm) greater than the cutting edge of the chisel. A weight of 10 lb (4.5 kg) shall be dropped 10 times from a height of 40 in. (101.6 cm).

4.4.4 Handle Static Force Test. Handles of assembled chisels shall not break, loosen, or otherwise fail when subjected to a load or bending force of 150 lb (667 N) when:

(a) the chisel body is locked securely in the test fixture with the struck face up and the handle extended in the horizontal plane; and

(b) a static force is applied vertically at a point on the handle measuring 10 in. (254 mm) from the top of the tool head. (See Fig. 3.)

5 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

5.1

Metal chisels are special-purpose tools designed and intended only for the cutting, shaping, and removing of metal softer than the cutting edge of the chisel itself. Such softer materials may include cast iron, wrought iron, steel, bronze, copper, and the like. An initial cautious blow may be used to ascertain the relative hardness of the struck object with subsequent examination of the cutting edge. To avoid possible eye or other bodily injury, chisels shall not be used to cut objects as hard as or harder than the chisel cutting edge.

5.2

To avoid possible eye or other bodily injury, these tools shall not be used to cut stone or concrete.

5.3

A hammer blow should always be struck squarely with the hammer face parallel to the struck face of the chisel. Glancing blows, overstrikes, and understrikes should be avoided. No surface of the chisel other than the struck face shall be struck. The ball peen, hand drilling, or engineer's hammer of the appropriate type and size shall have a striking face with a diameter approximately 0.375 in. (9.53 mm) larger than the struck face of the chisel.

5.4

Chisels shall not be used for prying or wedging.

5.5

Safety goggles or equivalent eye protection conforming to ANSI Z87.1 shall be worn by the user and all persons in the immediate area where any chisel is being used to avoid possible eye injury from flying objects.

5.6

Chisels shall be inspected prior to each use, and their use discontinued at the first sign of bending of the chisel or of chipping or cracking of the cutting edge or the struck face.

5.7

Except as indicated in paras. 5.8 and 5.9, no area, section, or portion of the chisel shall be ground, welded, treated by reheating, or otherwise altered from the original condition as furnished by the manufacturer.

5.8

Dulling of the cutting edge may occur from tool usage. It shall be resharpened or redressed to the original contour only by the use of a whetstone or hand file.³

5.9

Any mushrooming of the chisel struck face shall be promptly redressed to its original contour by the use of a hand file.³

³ It is understood that industrial users with adequate facilities and properly trained personnel may choose to redress or resharpen these tools by other means without altering the metallurgical characteristics of the tools.

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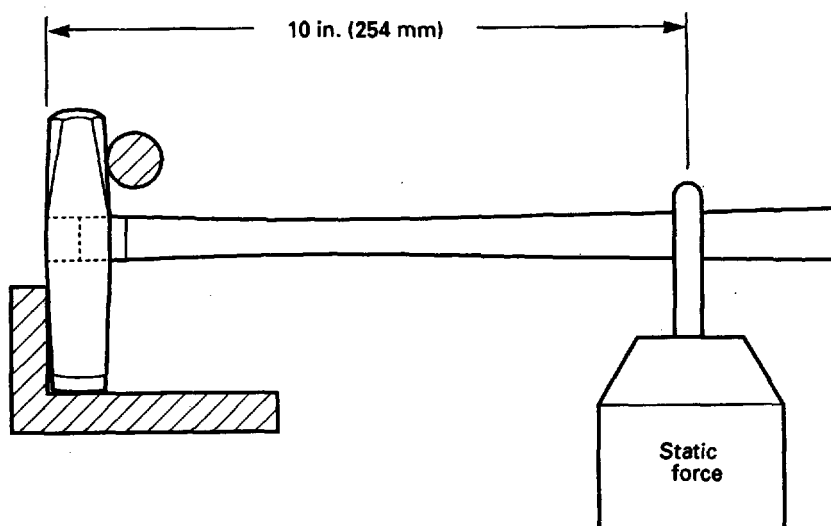


FIG. 3 TYPICAL STATIC FORCE TEST

5.10

Handles shall be inspected prior to each use; damaged handles shall be replaced. The handles of tools shall be free of splinters or cracks and shall be kept tight in the tool. Replacements shall withstand the test requirements specified in para. 4.4.4 and shall be equivalent to the original handle in size and quality.

5.11

Chisels with handles shall not be swung against the work but rather held by the handle with the chisel on the work and struck by a hammer of the appropriate type and size (see para. 5.3).

5.12

Instructors or employers, or both, shall stress proper use and safety in the use of chisels and shall emphasize the necessity to wear and ensure the use of safety

goggles. The publication *Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care* provides guidelines for the safe use of these tools.

5.13

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



WARNING
WEAR SAFETY GOGGLES
USER AND BYSTANDER

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.