ASME B107.400-2018

(Revision of ASME B107.400-2008)

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Striking Tools

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

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This Standard will be revised when the Society approves the issuance of a new edition.

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

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FOREWORD

The American National Standards Committee B107 on Socket Wrenches and Drives was originally under the sponsorship of The American Society of Mechanical Engineers (ASME). It was subsequently reorganized as an ASME Standards Committee and its title was changed to Hand Tools and Accessories. In 1996, the Committee's scope was expanded to include safety considerations.

In 1999, ASME initiated a project to consolidate hand tool standards by category of tool. The initial implementation included distinct standards within a single publication bearing a three-digit number corresponding to the responsible B107 subcommittee. It was intended that subsequent revisions would integrate the component standards, resulting in a more traditional document.

The 2008 issue of ASME B107.400 included several standards without replacing some of them. The individual standards remained in effect until this edition of ASME B107.400. ASME B107.56, Body Repair Tools was included in the 2008 edition of ASME B107.400, but is now a stand-alone document under separate cover.

The purpose of ASME B107.400 is to define essential performance and safety requirements specifically applicable to the various tools covered herein. It specifies test methods to evaluate conformance to the defined requirements and indicates limitations of safe use. This Standard supersedes, replaces, and renders obsolete the following standards:

ASME B107.41, Nail Hammers

ASME B107.42, Hatchets and Axes

ASME B107.53, Ball-Peen Hammers

ASME B107.54, Heavy Striking Tools

ASME B107.57, Bricklayers' Hammers and Prospecting Picks

ASME B107.58, Riveting, Scaling, and Tinners' Setting Hammers

In addition to the consolidation of these individual striking tool standards, this revision corrects the striking test from B107.57.

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

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

Members of the Hand Tools Institute Striking and Struck Tools Standards Committee, through their knowledge and hard work, have been major contributors to the development of the B107 standards. Their active efforts in the promotion of these standards are acknowledged and appreciated.

ASME B107.400-2018 was approved by the B107 Standards Committee on May 9, 2018 and by the Board on Standards and Testing on June 29, 2018. It was approved as an American National Standard on September 20, 2018. The requirements of this Standard take effect upon its issue date.

ASME B107 COMMITTEE
Hand Tools and Accessories

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

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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 or a case, and attending Committee meetings. Correspondence should be addressed to:

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.

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

Interpretations. Upon request, the B107 Standards 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.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the B107 Standards Committee at the above address. The request for an 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 in one or two words.
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. Please provide a condensed and precise question, composed in such a way that a "yes" or "no" reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of "Yes" or "No," with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

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

Moreover, ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

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 and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the B107 Standards Committee. Future Committee meeting dates and locations can be found on the Committee Page at http://go.asme.org/B107committee.

STRIKING TOOLS

1 SCOPE

This Standard provides performance and safety requirements for striking tools including hammers, hatchets, axes, sledges, and mauls listed in Table 1-1. The names and intended uses given in Table 1-1 are those generally recognized.

This Standard is intended to serve as a guide in selecting, testing, and using the hand tools covered herein. 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.

The designs covered by this Standard are not limited to those named or illustrated. Manufacturers may make conforming striking tools other than those listed. Consumers should consult with manufacturers concerning lists of stock products.

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

2 DEFINITIONS

If a term applies to a particular Category or Categories, the definition is preceded by the Category number(s) (see Table 1-1 and Figures 5.1-1 through 5.7-3 for the categories and the figures applicable to each).

ball peen: for Category 53 tools, the rounded portion of the hammerhead directly opposite the striking face.

bell: for tools in Categories 41, 42, 53, and 57, the portion of the head directly behind the striking face. See *poll*.

bevel:

(a) for Category 57 tools, the underside of the cutting edge (bit) of the bricklayer's hammer.

(b) for Category 58 tools, the angular portion on scaling and tinners' setting hammers adjacent to the bit or peen edge.

bit:

(a) for Category 42 tools, known as the blade bit and is the broad, tapering portion of the head that terminates in a sharpened cutting edge.

(b) for Category 58 tools, the portion of the scaling hammer at the extreme end of the bevel.

blade:

(a) for Category 54 tools, the broad tapering portion of the maul between the eye and the cutting edge of the woodchopper's maul.

(b) for Category 57 tools, the tapered portion of the bricklayer's hammerhead directly opposite the face.

chamfer:

(a) for tools in Categories 41, 42, and 53, the bevel or equivalent radius encircling the perimeter of the striking face.

(b) for Category 54 tools, the bevel or equivalent radius encircling the perimeter of the striking face; also, the bevel on the ends of peening surfaces and scoring edges (see Figures 5.5-1 through 5.5-12).

(c) for Category 57 tools, the angled flat surface or equivalent radius encircling the perimeter of the face of the bricklayer's hammer and prospecting picks and at both ends of the cutting edge of the bricklayer's hammer.

(d) for Category 58 tools, the bevel or equivalent radius of riveting and tinners' setting hammers encircling the perimeter of the striking face; also refers to the bevels on the ends of the peen faces, peen edges, or bits of hammers.

cheeks: for tools in Categories 41 and 57, see *sides*.

claw: for Category 41 tools, the two-pronged portion of the hammerhead directly opposite the striking face.

claw bevel: for Category 41 tools, when provided, the angled portion of the nail slot.

cutting edge:

(a) for Category 42 tools, the sharpened edge of the bit.

(b) for Category 54 tools, the sharpened end of the blade of the woodchopper's maul.

cutting edge (bit): for Category 57 tools, the edge directly opposite the face of the bricklayer's hammerhead at the extreme end of the blade.

digging blade: for Category 42 tools, 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.

Table 1-1 Striking Tools

Category	Type	Common Name	Intended Use(s)	Figure(s)
41	I nonwedged II wedged	Nail hammers	Driving or pulling unhardened nails and ripping apart or tearing down wooden components	5.1-1
42	I	Hatchets: Class 1: lath, shingling, box, wallboard Class 2: All others	Driving unhardened nails or striking wood products, or both; cutting, notching, and shaping wood products or wall board products, or both; cutting, spacing, and aligning soft roofing products; and pulling unhardened nails when the tool is provided with a nail slot	5.2-1
	II	Axes: Class 1: double bit Class 2: single bit Class 3: fire ax Class 4: Pulaski pattern or mattock	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; digging when the ax is provided with a digging blade	5.3-1
53	I nonwedged II wedged	Ball-peen hammers	Striking punches and chisels; riveting, shaping, and straightening unhardened metals	5.4-1
54	I	Blacksmith's double-face sledge	General sledging operations in striking wood, metal, masonry, and stone	5.5-1
		Nevada long-pattern striking hammer		5.5-2
		Oregon short-pattern striking hammer		5.5-3
		Hand-drilling hammer	Striking chisels, punches, star drills, ASME B107.410 Category 52 Type I, and hardened nails	5.5-4
		Ship or boat maul	Driving bolts (iron, copper rods, or dowels), pins, spikes, and T-nails (wood)	5.5-5
		Lineman's or farrier's turning hammer	Linework; forming and shaping horseshoes	5.5-6
		Railroad spike maul	Driving railroad spikes	5.5-7 5.5-8
	II	Woodchopper's maul	Splitting logs; driving metal wood-splitting wedges into logs	5.5-9
	III	Blacksmith's cross-peen sledge	General sledging operations in striking wood, metal, masonry, and stone; bending and peening unhardened metal	5.5-10
		Stone sledge	Making score lines in stone and masonry; breaking up stone and masonry	5.5-11
	IV	Spalling hammer	Cutting and shaping stone and masonry	5.5-12
	V	Bush hammer	Roughing and chipping concrete or stone	5.5-13
57	I	Bricklayers' hammers	Setting and cutting (splitting) bricks, masonry tile, concrete tile, and concrete blocks; chipping mortar from bricks	5.6-1
	II	Prospecting picks	Pulling samples from the ground	5.6-2
58	I	Riveting hammers (also called tinners' or machinists' riveting hammers	Driving, spreading, and setting unhardened rivets in hardened materials	5.7-1
	II	Scaling hammers (also called chipping hammers)	Removing scale, paint, welding flux, rust, or other similar flaking material from the surface of unhardened metal	5.7-2
	III	Tinners' setting hammers (also called peening hammers)	Closing, forming, and peening sheet metal	5.7-3

equivalent: for tools in Categories 41, 42, 53, 54, and 57, alternative designs or features that will provide an equal degree of safety and performance.

eye: for tools in Categories 41, 42, 53, 54, and 58, an opening or aperture in the head into which the handle is inserted if the handle is separate.

face:

(a) for Category 42 tools, the flat portion of the ax head directly opposite the bit (when provided).

(b) for Category 57 tools, the portion of the bricklayer's hammerhead or prospecting pick head, exclusive of the bell and chamfer, located on the end of the head opposite the blade or pick end.

hammerhead: for tools in Categories 41 and 53, the portion of the hammer exclusive of the handle.

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

handle grip: additional material securely attached to the handle to be gripped during use.

hardness: resistance to indentation. Heat treatment will produce changes to the hardness of metal.

head: for Category 42 tools, the portion of the hatchet or ax exclusive of the handle or attachments.

marking gage: for Category 42 tools, when provided, the adjustable measuring device attached to the top edge of the bit.

nail slot: for Category 42 tools, when provided, a V-shaped opening in one noncutting edge of the bit.

neck:

(a) for Category 41 tools, the portion of the hammerhead between the eye and the bell.

(b) for Category 42 tools, when provided, that portion of the hatchet head between the eye and the bell.

(c) for Category 53 tools, the portions of the hammerhead located between the bell and the eye and the ball peen and the eye.

(d) for Category 57 tools, on some bricklayers' hammers of alternative design (see Figure 5.6-1), the portion of the hammerhead between the bell and the hammer eye.

peen:

(a) for Category 54 tools, the tapered portion of the hammer or sledge between the eye and the scoring edge.

(b) for Category 58 tools, the portion between the eye and peen face on riveting hammers, between the eye and peen edge on tinners' setting hammers, or between the eye and bevels on scaling hammers.

peen edge: for Category 58 tools, the portion of tinners' setting hammers directly opposite the striking face.

peen face: for Category 58 tools, the portion of rivet hammers directly opposite the striking face.

pick:

(a) for Category 42 tools, the pointed portion of the fire ax head directly opposite the bit.

(b) for Category 57 tools, the portion of the prospecting pick directly opposite the face.

poll:

(a) for Category 42 tools, when provided, that portion of the hatchet head between the eye and the striking face.

(b) for Category 54 tools, the portion of the hammer, sledge, maul, or bush hammer between the eye and the chamfer or striking face.

(c) for Category 58 tools, the portion between the eye and striking face chamfer on riveting hammers and tinners' setting hammers.

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

scoring edge: for Category 54 tools, the edge directly opposite the striking face of spalling hammers and stone sledges.

serrations: for tools in Categories 41 and 42, when provided, the geometric pattern of grooves on the striking face.

shall: indicates mandatory requirements of this Standard.

should: indicates a provision is of an advisory nature or is stated as a recommendation.

*sides (*or *cheeks):*

(a) for Category 41 tools, the outside surfaces of the hammerhead on either side of the eye located between the head and neck and the head and claw.

(b) for Category 42 tools, the outside surfaces of the head on either side of the eye and the bit.

(c) for Category 53 tools, the outside surfaces of the hammerhead on either side of the eye located between the two necks.

(d) for Category 57 tools, the outside surfaces of the hammerhead on either side of the eye located between the blade and chamfer or neck on bricklayers' hammers and the pick end and chamfer on prospecting picks.

spalling: for tools in Categories 41, 53 and 58, chipping or separation of material.

striking face:

(a) for tools in Categories 41 and 53, the portion of the hammerhead exclusive of the neck, bell, and chamfer located on the side of the eye opposite from the claw.

(b) for Category 54 tools, the portion of the head exclusive of the poll and chamfer located either on both ends of the head or on the end of the head opposite a peen or blade.

(c) for Category 58 tools, the portion of the hammerhead exclusive of the poll and chamfer directly opposite the peen face or peen edge.

striking-face crown:

(a) for tools in Categories 41 and 42, when provided, the convex shape or radius of the striking face.

(b) for Category 53 tools, the convex shape or radius of the striking face.

(c) for Category 54 tools exclusive of spalling hammers and bush hammers, the convex shape or radius of the striking face.

thong: for Category 42 tools, when provided, the strap attached to the grip end of the handle.

top: for Category 42 tools, the portion of the head opposite the handle.

top of hammer:

(a) for tools in Categories 41, 53, and 58, the portion of the hammerhead opposite the handle entry.

(b) for Category 57 tools, the portion of the hammer or prospecting pick head opposite the handle entry.

wedged hammer: for tools in Categories 41 and 53, a hammer with the handle secured to the hammerhead by a device inserted in the handle to expand the handle within the eye.

wedged tool: for Category 42, a tool that has the handle secured to the head by a device inserted in the handle to expand the handle within the eye.

3 REFERENCES

The following is a list of publications referenced in this Standard. Unless otherwise specified, the latest edition shall apply.

ANSI/ISEA Z87.1, Occupational and Educational Personal Eye and Face Protection Devices
ANSI Z535.4, Product Safety Signs and Labels
Publisher: American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036 (www.ansi.org)

ASME B107.410, Struck Tools
Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ASTM E18, Standard Test Methods for Rockwell Hardness of Metallic Materials
ASTM F1667, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 (www.astm.org)

Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care
Publisher: Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591 (www.hti.org)

ISO 7010, Graphical symbols — Safety colours and safety signs — Registered safety signs
Publisher: International Organization for Standardization (ISO), Central Secretariat, Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland (www.iso.org)

SAE J1703, Motor Vehicle Brake Fluid
Publisher: SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001 (www.sae.org)

4 CLASSIFICATION

Categories, Types, and Classes are shown in Table 1-1. Additional styles are listed in para 5.7.

5 PERFORMANCE REQUIREMENTS

(a) The illustrations shown herein are descriptive and nonrestrictive, and are not intended to preclude the manufacture of tools that otherwise comply with this Standard.

(b) Striking tools shall pass the tests specified in section 6 as applicable. Conformance to marking and other requirements not determined by test shall be subject to visual examination.

(c) Distances in tables are in inches unless otherwise specified.

5.1 Design — Category 41 Nail Hammers

Nail hammers shall have a striking face on one end of the hammerhead and a claw on the opposite end (see Figure 5.1-1). The striking face shall have a smooth or serrated convex shape.[1]

5.2 Design — Category 42 Type I Hatchets

Hatchets shall have a striking face on one end of the head and a blade or bit on the opposite end (see Figure 5.2-1). The striking face shall have a smooth or serrated surface and be convex or flat.[2]

5.3 Design — Category 42 Type II Axes

Axes may have a striking face on one end and a blade or bit on the opposite end (see Figure 5.3-1).

(a) 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.

(b) 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. The face may be a flat or slightly convex surface. Chamfering of the face is acceptable but not required. A nail slot in the bit is acceptable but not required.

(c) 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. The pick shall have a gradually reducing cross section terminating in a sharp point and ready for use.

(d) 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.

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.

5.4 Design — Category 53 Ball-Peen Hammers

Ball-peen hammers shall have a striking face on one end of the head and a ball peen on the opposite end (see Figure 5.4-1). The striking face shall have a convex shape. The ball peen shall have a smoothly contoured shape that is approximately hemispherical.

5.5 Design — Category 54 Heavy Striking Tools

Heavy striking tools shall have a striking face on one end while the other end shall have a striking face or a special purpose shape (see Figures 5.5-1 through 5.5-13). Striking faces on all heavy striking tools, except Type IV spalling hammers and Type V bush hammers, shall have a striking-face crown.

5.6 Design — Category 57 Bricklayers' Hammers and Prospecting Picks

Bricklayers' hammers shall have a face on one end of the head and a cutting edge on the opposite end (see Figure 5.6-1). Prospecting picks shall have a face on one end of the head and a pick on the opposite end of the head (see Figure 5.6-2). The faces of the heads shall be flat.

[1] Hammers with serrations on the striking face are intended for driving unhardened nails. The serrated face reduces the incidence of bending or dislodging of nails.

[2] Hatchets with serrations on the striking face are intended for driving unhardened nails. The serrated face reduces the incidence of bending or dislodging of nails.

5.7 Design — Category 58 Riveting, Scaling, and Tinners' Setting Hammers

Riveting, scaling, and tinners' setting hammers shall have a special purpose shape on one end and either a striking face or another special purpose shape on the opposite end. Both ends shall be designed for the specific purposes specified in Table 1-1. Various typical styles are referred to and are shown in Figures 5.7-1 through 5.7-3.

(a) The striking face of the tinner's setting hammer shall be flat. The striking faces of riveting hammers shall be flat or slightly convex.

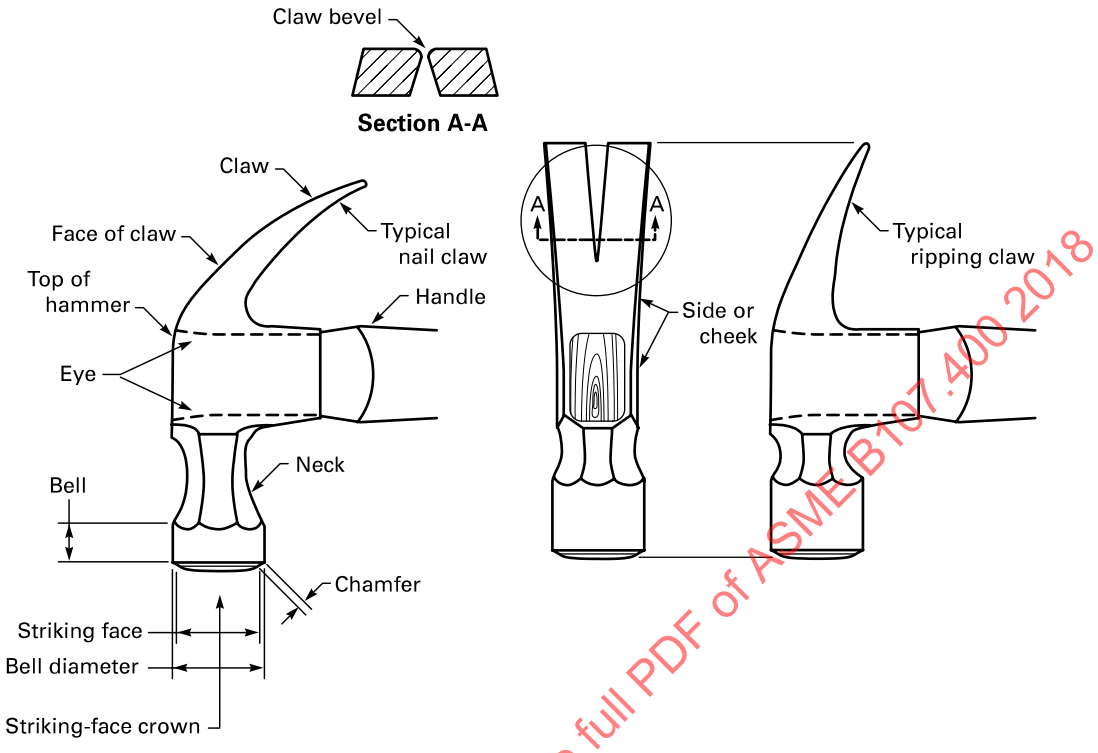
(b) The peen face of riveting hammers shall be rounded.

5.8 Materials

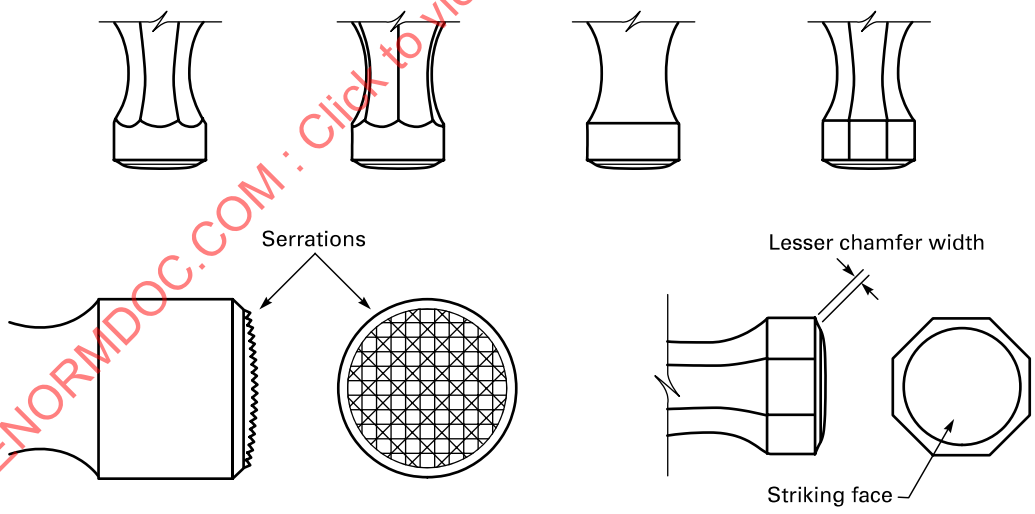
The materials used in the manufacture of striking tools shall be such as to produce tools conforming to the requirements specified herein.

Striking tools shall meet the requirements for hardness and chamfer in Table 5.8-1 and Figure 5.8-1.

Figure 5.1-1 Category 41 Nail Hammer Nomenclature



(a) Typical Nail Hammer



(b) Equivalent Shapes of Hammer Neck and Bell

Figure 5.2-1 Category 42 Type I Hatchet Nomenclature

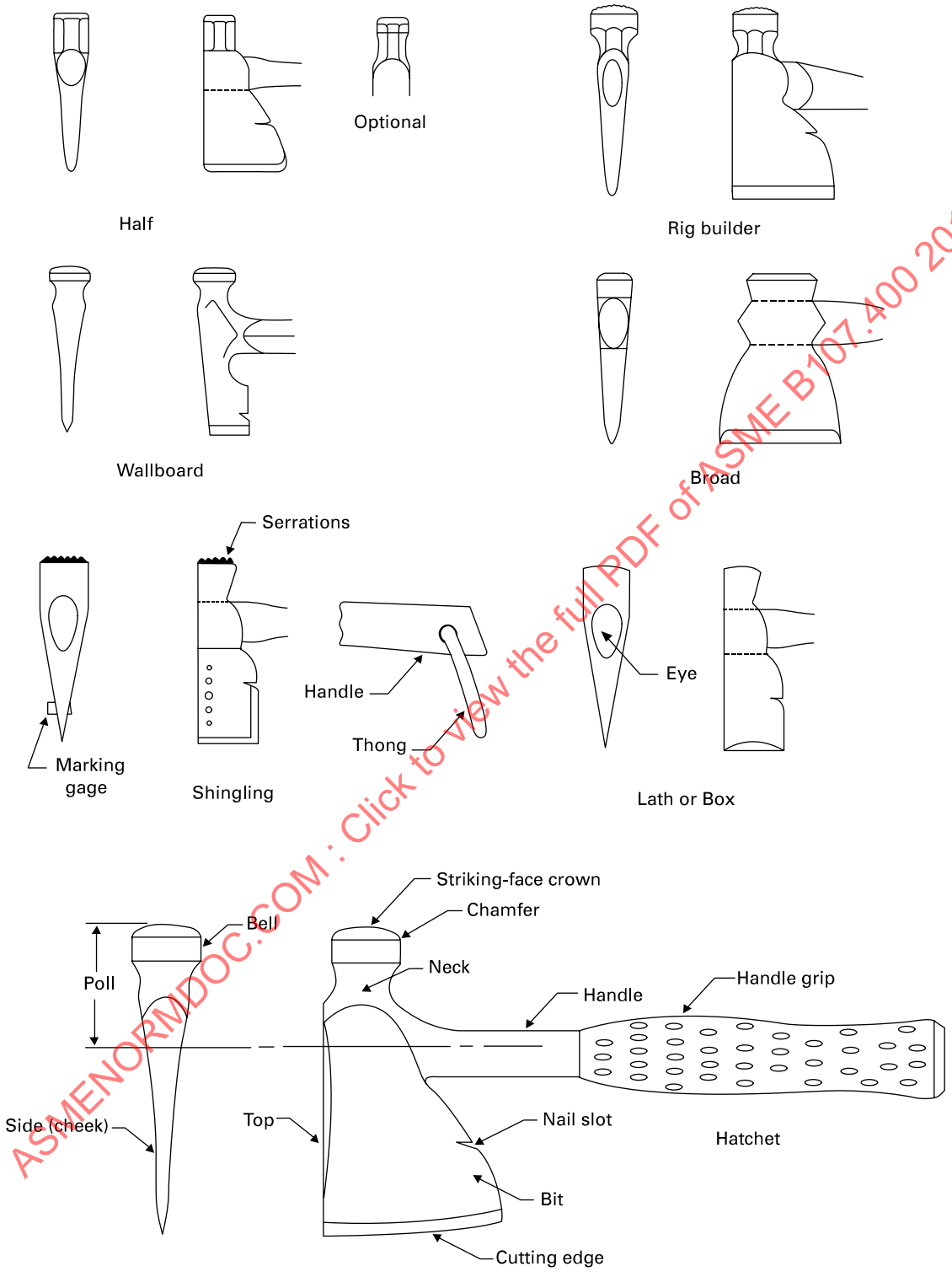
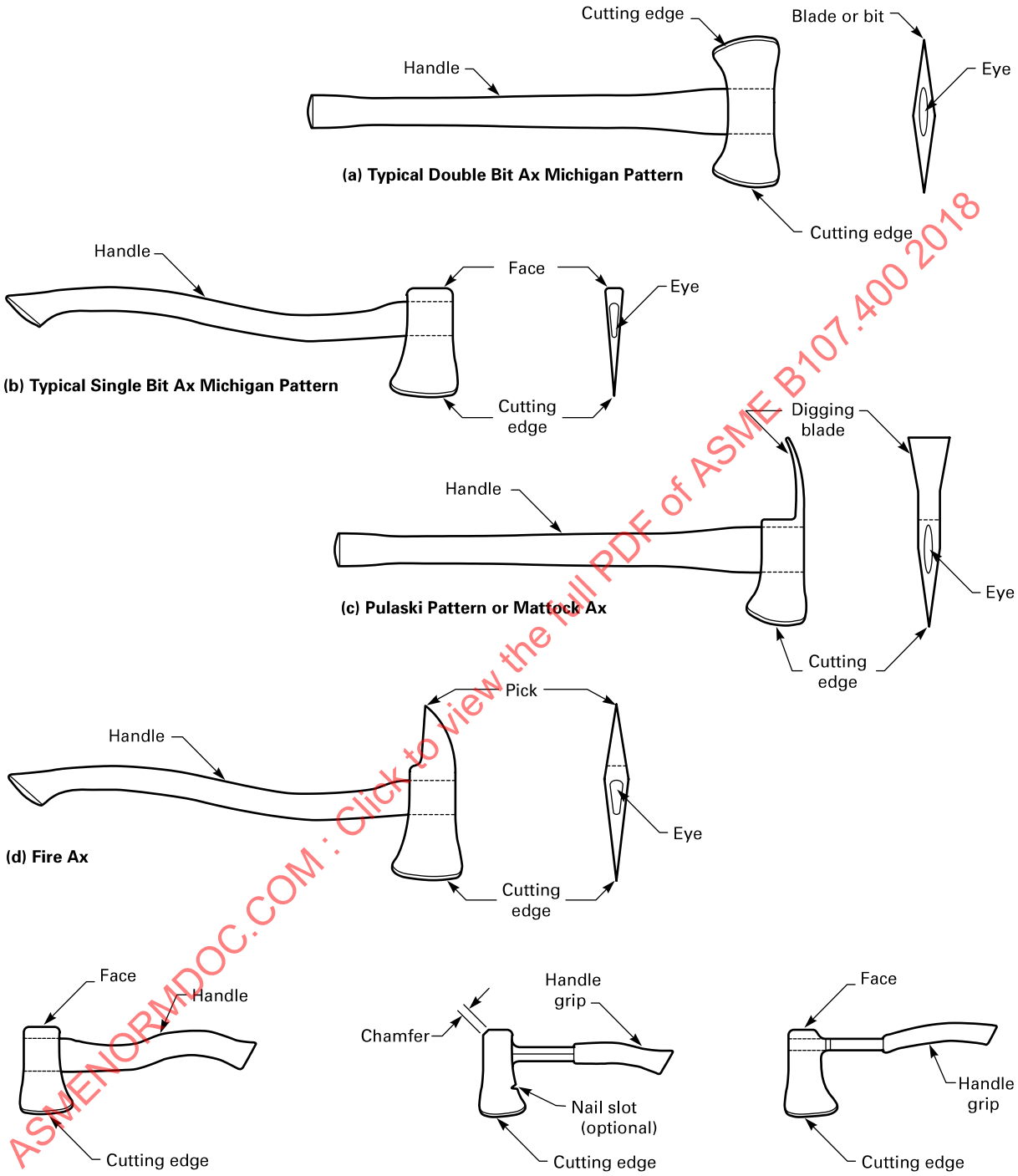


Figure 5.3-1 Category 42 Type II Ax Nomenclature



(a) Typical Double Bit Ax Michigan Pattern

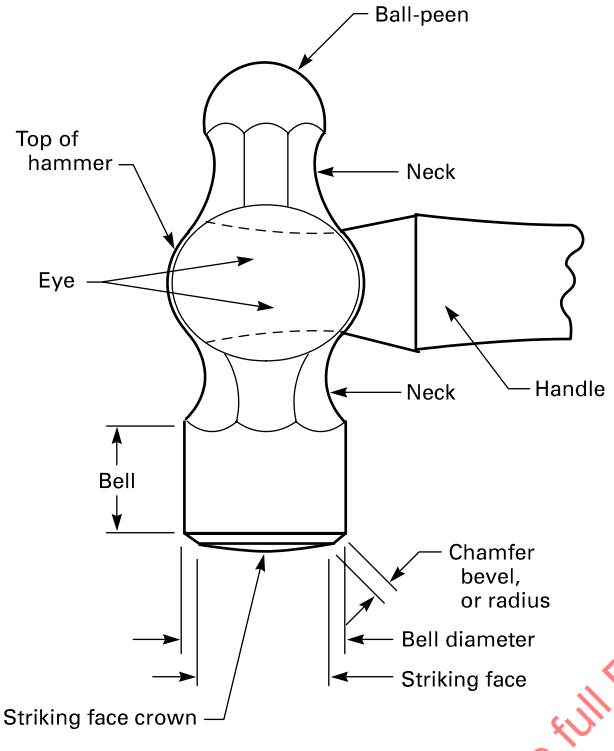
(b) Typical Single Bit Ax Michigan Pattern

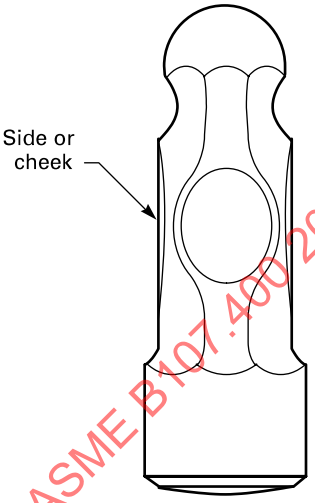
(c) Pulaski Pattern or Mattock Ax

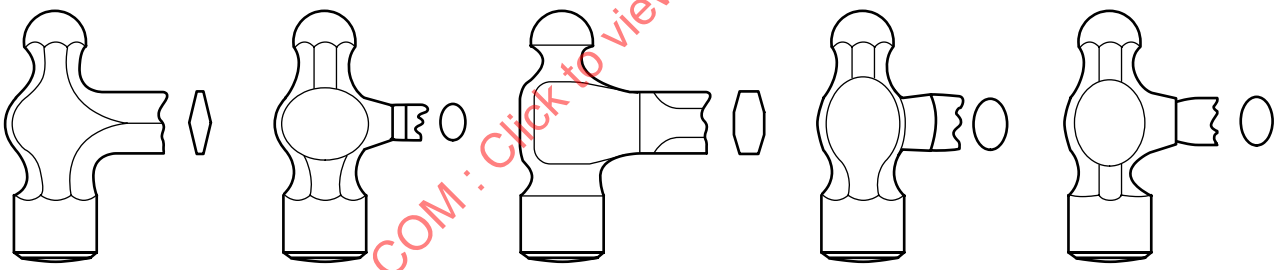
(d) Fire Ax

(e) Scout, Hunter's, Sportsman's, or Camp Ax

Figure 5.4-1 Category 53 Ball-Peen Hammer Nomenclature







Equivalent Shapes of Hammer Necks and Eyes

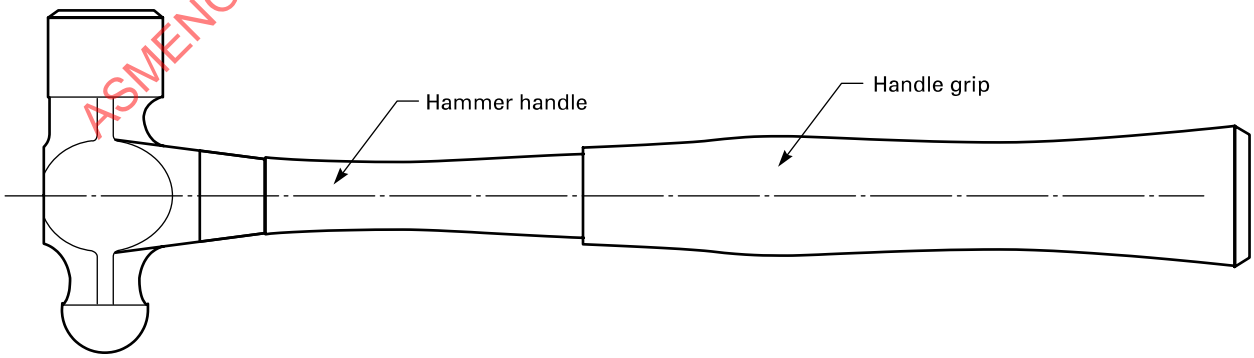


Figure 5.5-1 Category 54 Type I Blacksmith's Double-Face Sledge

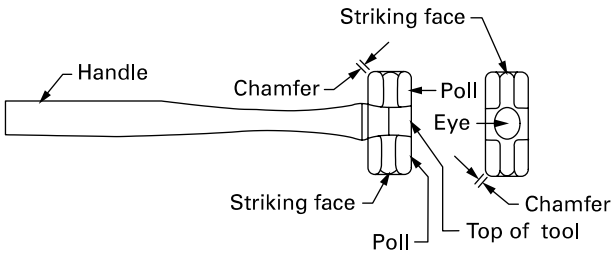


Figure 5.5-2 Category 54 Type I Nevada Long-Pattern Striking Hammer

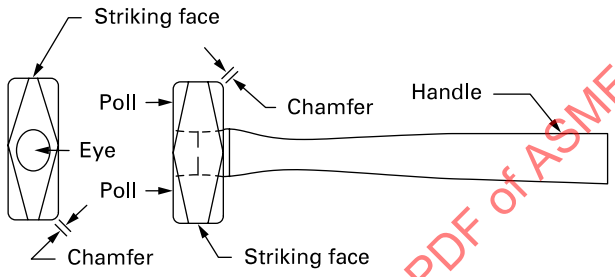


Figure 5.5-3 Category 54 Type I Oregon Short-Pattern Striking Hammer

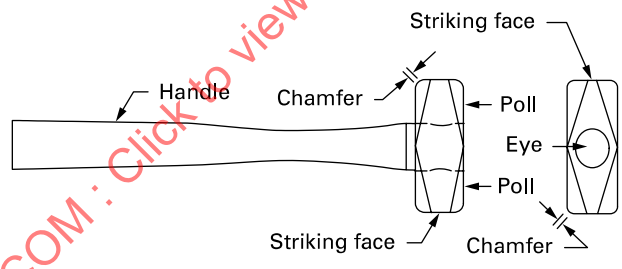


Figure 5.5-4 Category 54 Type I Hand-Drilling Hammer

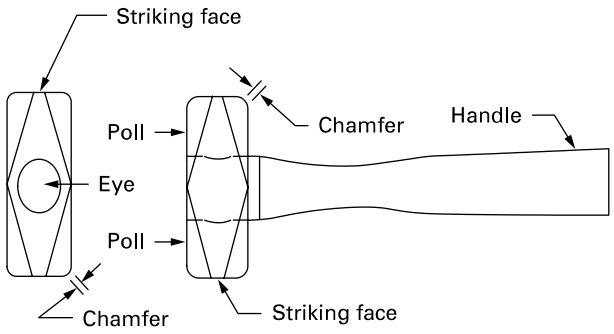


Figure 5.5-5 Category 54 Type I Ship or Boat Maul

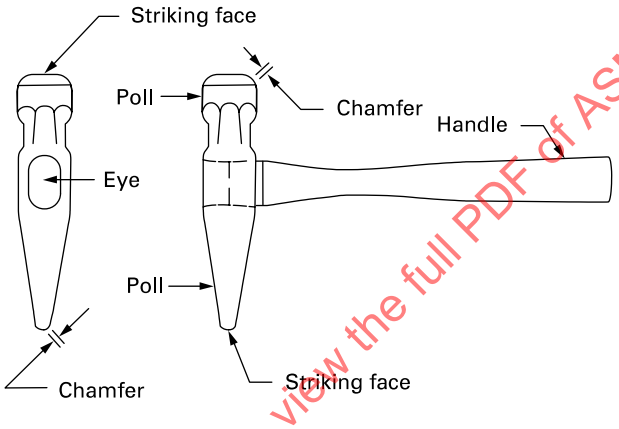


Figure 5.5-6 Category 54 Type I Lineman's or Farrier's Turning Hammer

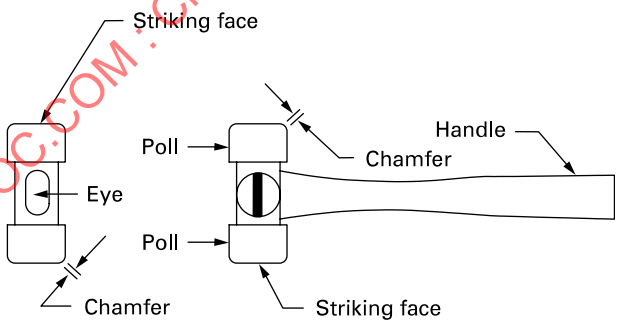


Figure 5.5-7 Category 54 Type I Railroad Spike Maul, Standard Pattern

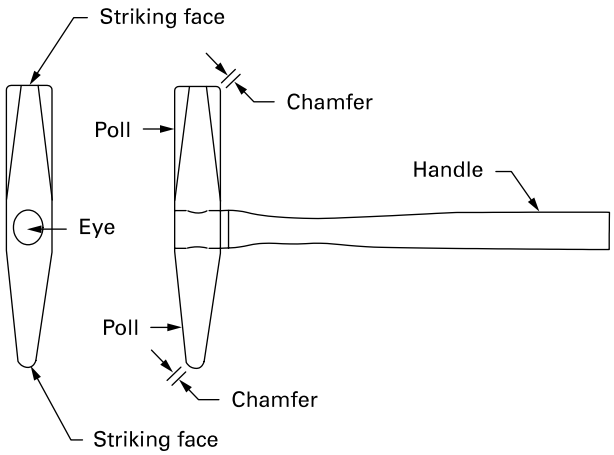


Figure 5.5-8 Category 54 Type I Railroad Spike Maul, Bell Pattern

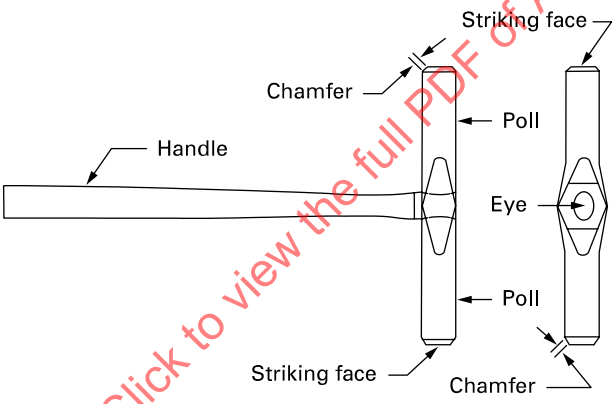


Figure 5.5-9 Category 54 Type II Woodchopper's Maul

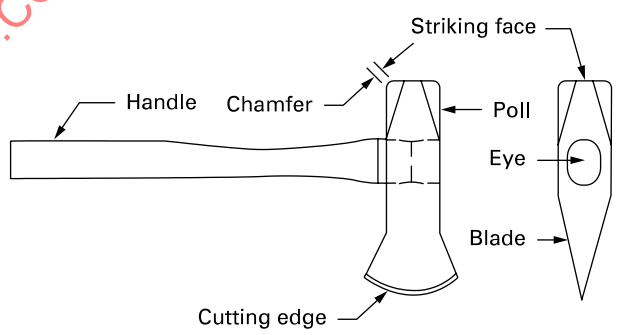


Figure 5.5-10 Category 54 Type III Blacksmith's Cross-Peen

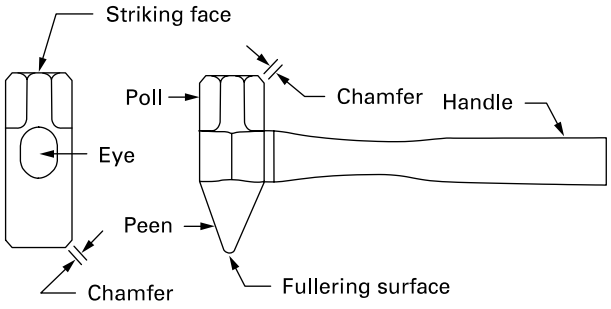


Figure 5.5-11 Category 54 Type III Stone Sledge

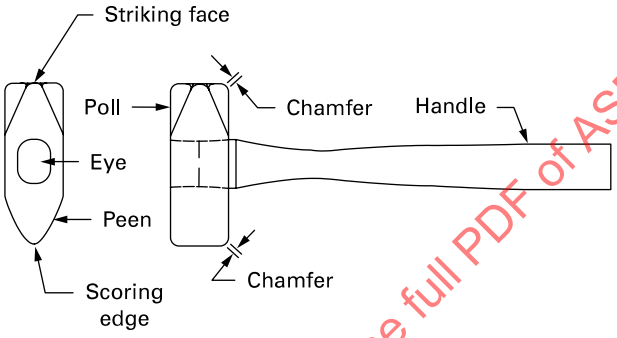


Figure 5.5-12 Category 54 Type IV Spalling Hammer

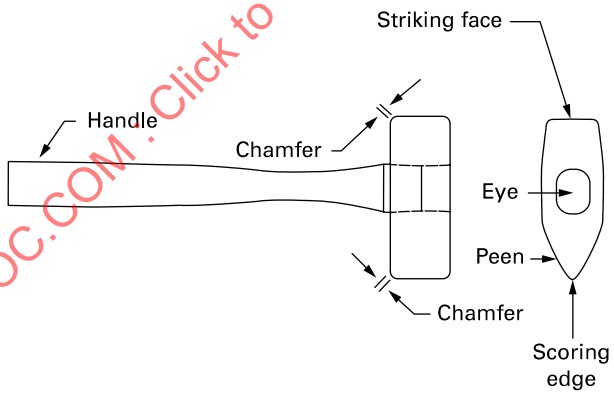


Figure 5.5-13 Category 54 Type V Bush Hammer

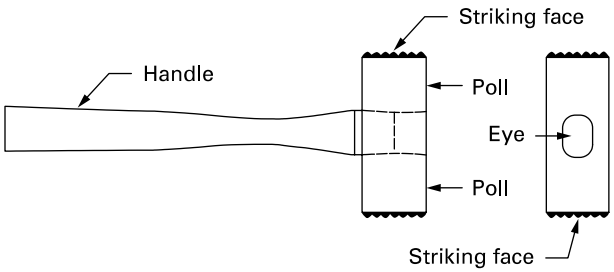


Figure 5.6-1 Category 57 Type I Bricklayers' Hammers

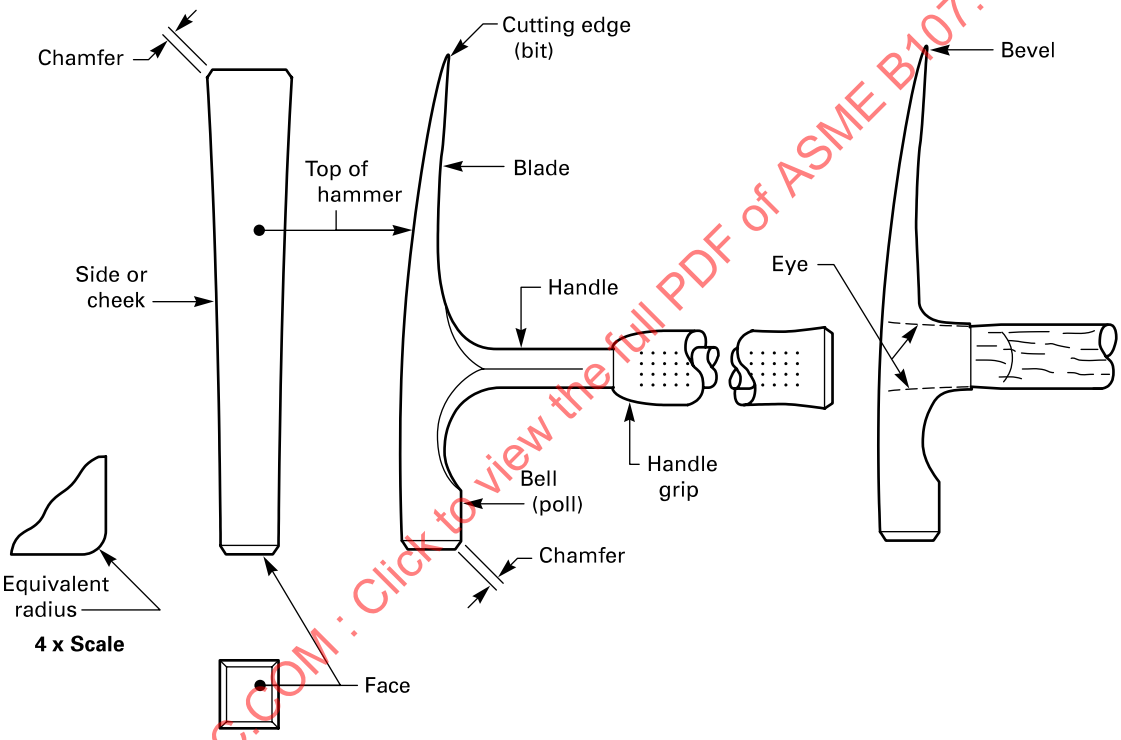


Figure 5.6-2 Category 57 Type II Prospecting Pick

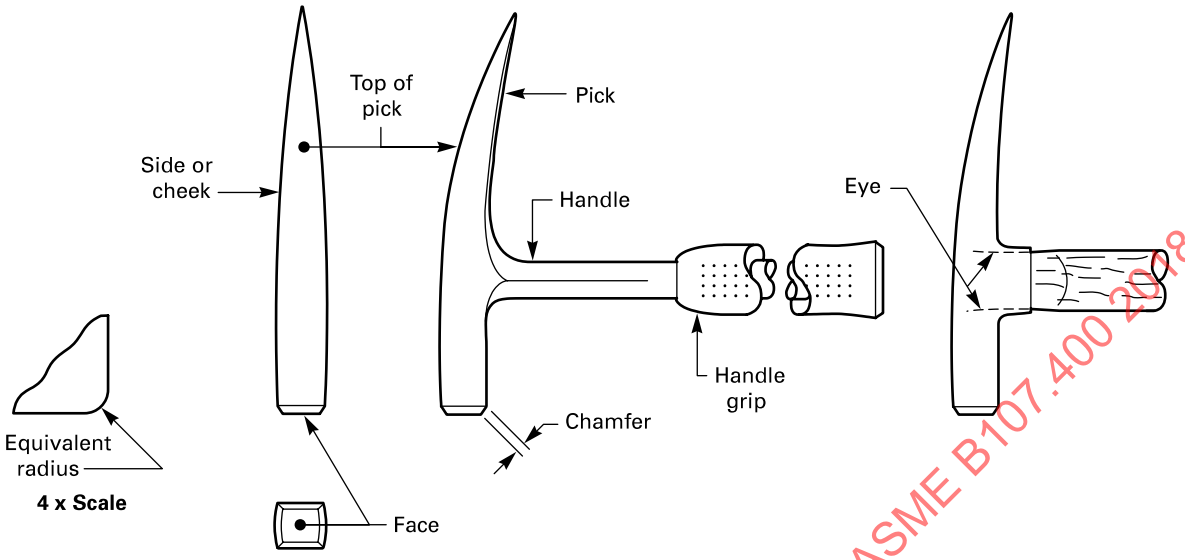


Figure 5.7-1 Category 58 Type I Riveting Hammer Nomenclature

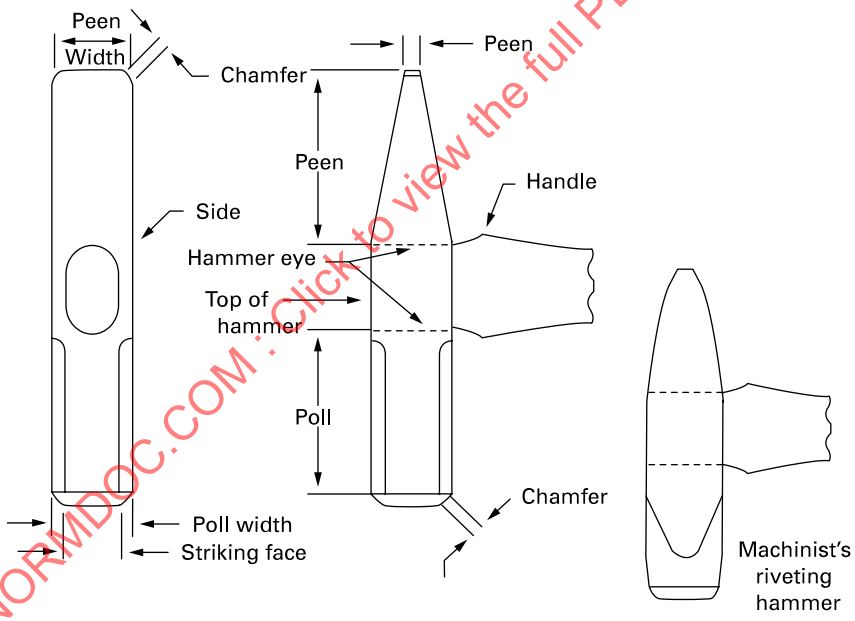


Figure 5.7-2 Category 58 Type II Scaling Hammer Nomenclature

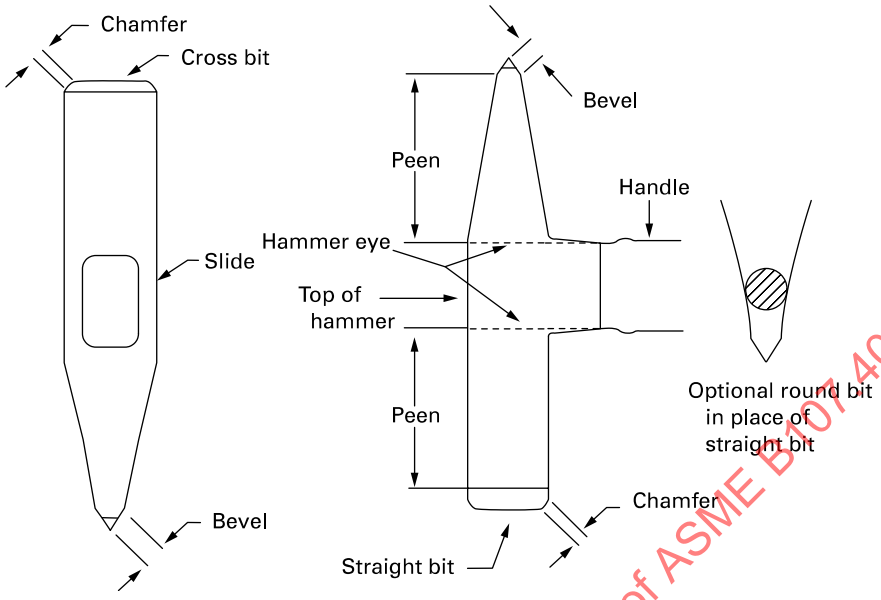


Figure 5.7-3 Category 58 Type III Tinner's Setting Hammer

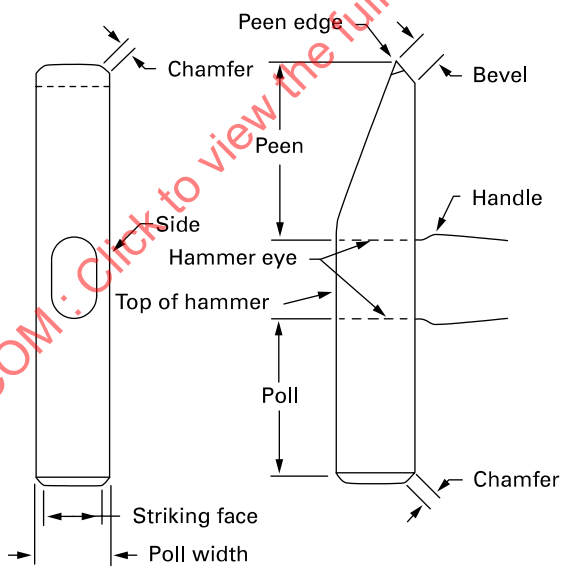


Table 5.8-1 Hardness and Chamfer Requirements

Category	Type	Hardness, HRC [Note (1)]	Chamfer, Figure 5.8-1 [Note (2)]
41	...	S 45–60, C 40–55 0.75	45 D10
42	I	S 45–60, C 40–55 0.75	45 D10
42	II	B 45–60 0.5 A, F 60 A, E 40 A	...
53	...	S 45–60 A, P 45–60 A	45 D10
54	I	S 45–60 A	45 D10
54	II	S 44–55, B 45–60 0.75	45 D10
54	III	S 45–60 A, P 45–60 0.5	45 D10 P
54	IV	S 45–60 A, P 45–60 0.5	45 D10 P, no crown
54	V	S 45–60 A	No chamfer, no crown
57	I	S 45–60 A, P 45–60 0.75	45 D6
57	II	P 45–60 0.75	...
58	All	S 45–60 A, P 45–60 A	45 D10

NOTES:

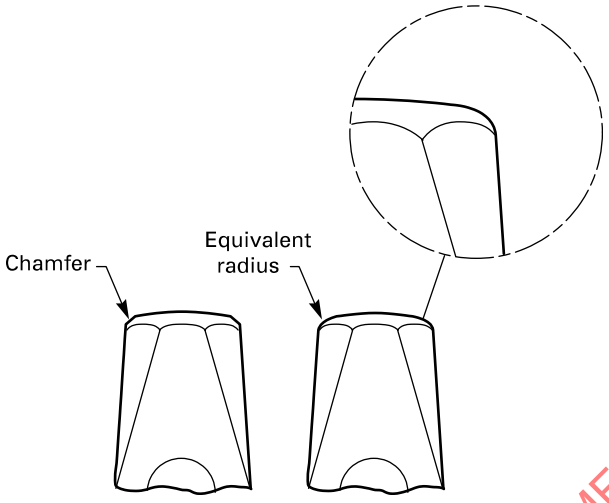
(1) Abbreviations used in the "Hardness, HRC" column are as follows:

- A The material directly behind the striking face shall be a toughened supporting core that gradually decreases in hardness.
- B Blades shall be hardened and tempered to specified range for minimum distance specified from the cutting edge.
- C Claws shall be hardened and tempered to specified range for minimum distance specified from the tip end.
- E Eye maximum hardness.
- F Face maximum hardness.
- P Peens/picks shall be hardened and tempered to specified hardness for specified minimum distance from the peening surface/scoring edge/end.
- S Hardness value range specified applies to striking face.

(2) Chamfer dimensions are as follows:

- 45 The striking face shall have a chamfer of approximately 45 deg (or equivalent radius) around the perimeter.
- D10 With the width approximately equal to one tenth of the diameter of the bell, as measured across the chamfer angle or the lesser chamfer width for bell shapes other than circular (see Figure 5.1-1). For example, if the bell diameter equals 1.0 in., then the chamfer width equals approximately 0.1 in.
- D6 With the width equal to approximately 0.06 in. The underside of the cutting edge or bit of the bricklayers' hammer shall have a bevel of approximately 30 deg to 45 deg. The two outer corners of the cutting edge shall have a chamfer of approximately 45 deg or equivalent radius.
- P The ends of peening surfaces and scoring edges shall have a chamfer of approximately 45 deg (or equivalent radius).

Figure 5.8-1 Chamfer/Equivalent Radius



6 TESTS

Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be employed in conducting such tests. These tests are designed to evaluate the tools and materials and do not condone the use of the tools in an environment, or in a manner, inconsistent with safe use of the tools. Except where specified, separate (new) tools shall be used for each of the tests. Failure to meet the requirements of any one of the tests indicates that the tool does not comply with this Standard.

6.1 Hardness Determination Test

Hardness determination shall be made in accordance with ASTM E18.

6.2 Striking and Tensile Force Tests

6.2.1 Striking Test. Prior to tensile force testing, the tool shall withstand 20 full swinging blows by a person of average build, 160 lb to 180 lb, or the mechanical equivalent, commensurate with the end use and weight of the tool. If the Category 54 handle length exceeds 24 in., the number of blows shall be 100. The test shall be conducted at room temperature. The blows shall be delivered with the tool held or fixtured at the normal gripping area. The blows shall be struck against a target object per Table 6.2-1. The head shall not permanently deform, crack, or break. Handles shall not loosen, separate from the head, crack, or break. The striking face or ball peen shall not compress, mushroom, chip, crack, or spall when subjected to the striking test.[3]

6.2.2 Tensile Force Test. Following the striking test, the head and handle shall not loosen or separate under the tensile force specified in Table 6.2.2-1 (see Figure 6.2.2-1). Handles shall not loosen or separate from heads, crack, or break.

6.3 Static Force Test

The head shall be locked securely in test fixture with the striking face down and the handle extended in the horizontal plane. A static force shall be applied vertically at a point on the handle measuring 10 in. from the top of the head (see Figure 6.3-1), except Category 42 Type II, which shall be applied 3 in. from the end of the handle (Figure 6.3-2), and Category 53 under 2 oz head weight, which shall be applied 9 in. from the top. The force shall be as shown in Table 6.3-1. Handles shall not break, loosen, or otherwise fail.

[3] The striking test is so severe that a degree of permissible deformations of serrations on the striking face of hammers can be anticipated. On double-faced tools where both faces are striking faces, both faces shall be tested.

6.4 Grip Tests

All handles with grips shall be subjected to the following tests in the order shown. The same tools shall be used for the full set of tests.

6.4.1 Solvent Resistance Test. Grips shall be fully immersed in the test fluids specified (new sample grips shall be used for each test fluid) for 15 min to 20 min at room temperature, removed, and let stand for 24 hr to 28 hr. Test fluids are SAE J1703 brake fluid, gasoline, ethylene glycol, and ethyl alcohol. There shall be no significant swelling nor surface attack of the material being tested. Grips shall be tested while attached to the tool handle.

6.4.2 Grip Twist Test. Tools shall be secured by hand and the grip twisted at the normal hand grip position in alternating directions producing a torque of 40 lbf-in. to 60 lbf-in. (approximated by a person of average build, 160 lb to 180 lb). Five alternating twisting motions shall be performed, after which there shall be no grip looseness or separation from the handle.

6.4.3 Grip Adhesion Test

(a) Mechanically bonded grips shall be tensile force tested using the values for wedged tools in Table 6.2.2-1 (for wedged and nonwedged tools) or 500 lbf (whichever is less), applying the force only to the grip (using a woven wire cuff or other suitable device). The grip shall not loosen or separate from the handle.

(b) Chemically bonded grips shall be cut longitudinally so that a segment may be pulled. The segment shall separate from the handle such that some of the grip material that was pulled shall remain adhered to the handle.

6.5 Spalling Test (Categories 41, 42, 53, 58)

The tool shall withstand ten full swinging blows by a person of average build, 160 lb to 180 lb, or the mechanical equivalent, commensurate with the end use and weight of the tool. The blows shall be delivered with the tool held or fixtured at the normal gripping area. The test shall be conducted at room temperature. The blows shall be struck against the smooth flat surface of a rigidly supported steel object that has a minimum diameter of 3 in., a minimum length of 2 in., and a minimum hardness of 55 HRC or equivalent. The face of the struck object shall be set to an angle of 10 deg to 20 deg with respect to the striking face. No spalling of the striking face shall occur.

6.6 Claw Test—Category 41

6.6.1 Specified Board Thickness. Two nails, as specified for the respective hammerhead weight in Table 6.6.1-1, shall be driven through sound planks or boards of a suitable softwood (such as yellow pine) of the thickness specified in Table 6.6.1-1. The nails should be spaced so as not to interfere with the pulling operation. The head shall be driven flush with the plank on one side. The protruding end of the nail on the other side of the plank shall in turn be gripped with the claw, and the handle quickly and forcibly moved to pull the nail through the board. As each pulling test is begun, the face of the claw shall be in contact with the surface of the board where the nail protrudes, and during the pulling stroke, contact of the hammerhead with the board shall be maintained by moving the hammer handle through an arc until the striking face of the hammer touches the board.

6.6.2 Nonspecified Board Thickness. Two nails, as specified for the respective hammerhead weight in Table 6.6.2-1, shall be driven into either hardwood, such as oak or sound pine, joists or beams, or layers of planks of such thickness that the pointed end of the nail does not protrude. The head end of the nail shall protrude an amount sufficient to enable the nail body to be gripped under the head with the claw, so that the claw face is in contact with the wood where the nailhead protrudes. Each nail shall be withdrawn up to the limit of possible movement of the handle by applying the necessary force.

6.6.3 Results. The nail pulling claws shall not permanently deform, crack, or break. Handles shall not separate from the hammerhead, loosen, crack, or break.

6.6.4 Ripping Hammers. The static force test procedure shall be used for this test. The load shall be increased to 125% of the static test load, or until failure of the hammer handle, whichever occurs first. The handle shall not fail below the static force test load. The claw shall not fail.

6.7 Impact Test — Category 42 Type II

The sample ax head shall be locked securely in a test fixture with the head flat on the bench or other flat support with the bit from the lower portion of the eye overhanging the edge of the bench. The bits of the sample heads shall not fracture or deform when subjected to two hard blows with a 3.5 lb to 4.0 lb wooden mallet on each side of that portion of the bit that overhangs the edge of the bench or other flat support (see Figure 6.7-1).

Table 6.2-1 Striking Test Target Objects

Tool		
Category	Type	Target Object
42	II	Hard wood material that is rigidly supported
54	24 in. and longer	A steel die block with a hardness of 92 HRB to 105 HRB or equivalent. The test block shall be at least 8 in. thick. The contact surface shall be large enough and/or adequately protected on the sides to minimize the risk of hitting the edge of the block with the swinging blows
All others		The smooth, flat, or slightly convex surface of a rigidly supported steel object that has a minimum diameter of 3 in., a min. length of 2 in., and a hardness of 92 HRB to 105 HRB or equivalent.

Table 6.2.2-1 Tensile Force Test

Tools				
Category	Type	Class	Head Weight, oz	Force, lbf
41, 53	I	...	Less than 13	750
41, 53	I	...	13 and over	2,250
41	II	...	Less than 13	400
41	II	...	13 and over	1,000
42	I	...	S 45-60 A	150
42	I	1	...	500
42	II	2	...	1,000
53	II	...	Up to and including 6	200
53	II	...	Over 6 and less than 20	400
53	II	...	20 and over	1,000
54	...	...	...	1,000
57	...	...	Less than 20	400
57	...	...	20 and over	1,000
58	...	...	Less than 16	300
58	...	...	16 and over	800