ASME B107.410-2018

(Revision of ASME B107.410-2008)

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Struck Tools

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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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.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the Committee web page and under http://go.asme.org/InterpsDatabase. Periodically certain actions of the ASME B107 Committee may be published as Cases. Cases are published on the ASME website under the B107 Committee Page at http://go.asme.org/B107committee as they are issued.

Errata to codes and standards may be posted on the ASME website under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The B107 Committee Page can be found at http://go.asme.org/B107committee. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting "Errata" in the "Publication Information" section.

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 B107.410 included several standards without replacing some of them. The individual standards remained in effect until this edition of ASME B107.410.

The purpose of ASME B107.410 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 B107.43, Wood-Splitting Wedges

ASME B107.44, Chisels — Glaziers', Wood, Ripping, Flooring/Electricians'

ASME B107.46, Stud, Screw, and Pipe Extractors

ASME B107.48, Metal Chisels, Punches, and Drift Pins

ASME B107.49, Nail Sets

ASME B107.50, Brick Chisels, Brick Sets, and Star Drills

ASME B107.52, Nail-Puller Bars and Pry Bars

ASME B107.59, Slugging and Striking Wrenches

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 B107.410-2018 was approved by the B107 Standards Committee on August 17, 2018, and by the Board on Standards and Testing on November 7, 2018. It was approved as an American National Standard on November 9, 2018. The requirements of this Standard take effect upon its date of issuance.

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

Secretary, B107 Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
http://go.asme.org/Inquiry

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.

STRUCK TOOLS

1 SCOPE

This Standard provides performance and safety requirements for struck tools, including splitting wedges; glaziers' chisels; wood chisels; ripping chisels; flooring/electricians' chisels; handheld screw and pipe extractors; handheld and handled metal chisels, punches, and drift pins; nail sets; brick chisels, brick sets, and handheld star drills; nail-puller bars; pry bars; and slugging and striking wrenches. The tools covered herein are listed by Category number 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 struck tools other than those listed. Consumers are requested to 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 for the struck tool Categories and the figures applicable to each).

appropriate striking tool: a striking tool with a striking face not less than 0.375 in. (9.53 mm) larger in diameter than the struck face of the struck tool (see Table 2-1).

bevel:

(a) for Category 43 tools, the angular portion of the wedge adjacent to the splitting edge and extending to the taper.

(b) for Category 44 tools, the angular or curved portion of the chisel adjacent to the cutting edge extending to the blade or taper.

(c) for Category 48 tools, the conical portion of the punch adjacent to the point end extending to the taper or the angular portion of the chisel adjacent to the cutting edge extending to the taper.

(d) for Category 50 tools, the angular portion of the brick chisel, brick set, or star drill adjacent to the cutting edge and extending to the taper.

blade: for Category 44 tools, the portion of the glaziers' or wood chisel opposite the struck face used for cutting.

body:

(a) for Category 44 tools, on glaziers' and wood chisels, the metal portion of the chisel extending from the blade. On ripping and flooring/electricians' chisels, the straight portion of the chisel between the chamfer and the taper.

(b) for Category 46 tools, the portion of the extractor exclusive of the taper and/or flutes.

(c) for Category 48 tools, the straight portion of the punch or chisel between the chamfer and taper or the tapers of the drift pin.

(d) for Category 49 tools, the portion of the nail set between the head and taper, used for holding during nail-setting operation.

(e) for Category 50 tools, the straight portion of the chisel or set between the chamfer and the taper or the straight portion of the star drill between the chamfer on one end and the taper, flute, and flute side on the other end.

(f) for Category 52 tools, the straight portion of the bar (excluding the handle grip when provided) used for gripping during nail-pulling or prying operations.

box end: for Category 59 tools, the portion of wrench that engages axially with the hex head of a threaded fastener.

chamfer:

(a) for Category 43 tools, the angled flat surface or equivalent radius of the wedge encircling the perimeter of the struck face.

(b) for Category 44 tools, the angled flat surface or equivalent radius between the struck face and the body of the chisel encircling the perimeter of the struck face.

Table 1-1 Striking Tools

Category	Type	Class	Common Name	Intended Use(s)	Figure(s)
43	...	...	Wood-splitting wedge	Splitting wood	5.1-1, 5.1-2, 5.1-3
44	I	...	Glaziers' chisel	Installing and removing putty around window panes and general wood chisel work relating to glazing	5.2-1
	II	...	Wood chisel	Making rough and finish cuts in wood	5.2-2, 5.2-3
	III	...	Ripping chisel	As a lever for light prying in dismantling wood construction and removing nails	5.2-4
	IV	...	Flooring/electricians' chisel	Cutting high spots and tongues from subflooring, removing installed floor sections, and making cutouts for electrical outlet boxes	5.2-5
46	I	...	Multi-spline extractor	Removing broken screws, pipes, bolts, studs, and fittings from threaded openings only in applications that require striking of the extractor to seat it properly in the broken pipe or fastener being removed	5.3-1
	II	...	Spiral flute extractor		5.3-2
	III	...	Straight flute extractor		5.3-3
	IV	...	Tapered flute extractor		5.3-4
48	I	...	Metal chisel	Cutting and shaping metal objects in hand-driven applications only	5.4.1-1
		1	Cape	Cutting grooves and keyways	5.4.1-1
		2	Cold	General-purpose cutting and shaping	5.4.1-1
		3	Concave splitting	Splitting bushings, mufflers, and tailpipes	5.4.1-1
		4	Diamond point	Cutting V-grooves, inside corners, and square holes	5.4.1-1
		5	Half-round	Cutting grooves	5.4.1-1
		6	Blacksmith's cold	Handle-held cold chisel for general-purpose cutting and shaping	5.4.1-2
	II	...	Punches	Marking metal, and driving and removing such things as pins and rivets, in-hand driven applications only	5.4.2-1
		1	Backing-out	Handle-held punch for backing out and driving such things as rivets and pins (a.k.a. blacksmith's backing-out)	5.4.2-2
		2	Bearing race	Punch used for removing races from bearings	5.4.2-1
		3	Center	Punch used for marking by indentation to start drills in metal and other materials	5.4.2-1
		4	Drift or lining-up	Punch used for aligning and sizing holes in metal and other materials	5.4.2-1
		5	Pin	Punch used for driving and removing such things as pins and keys after initial movement by a starting punch	5.4.2-1
		6	Prick	Punch used for marking by indentation, as in layout work, and piercing holes in light gage metal and other materials	...
		7	Round	Handle-held punch for drifting holes, aligning, and drifting and driving such things as pins (a.k.a. blacksmith's round)	5.4.2-2
		8	Starting	Punch used for loosening such things as frozen pins and keys	5.4.2-1
	III	...	Drift pin	Aligning and sizing holes in metal and other materials	5.4.3-1
49	I	...	One-piece nail set	Setting unhardened finishing nails below the surface of the material being nailed	5.5.1-1
	II	...	Self-centering (center punch) nail set		5.5.2-1
50	I	...	Brick chisel	Scoring and cutting brick and masonry block	5.6-1, 5.6-2
	II	...	Brick set		5.6-1, 5.6-2
	III	...	Star drills	Drilling holes in brick, tile, concrete, or stone	5.6-3

Table 1-1 Striking Tools (Cont'd)

Category	Type	Class	Common Name	Intended Use(s)	Figure(s)
52	I	...	Struck nail-puller bar	Intended primarily for use in extracting nails	5.7.1-1
	II	...	Nonstruck nail-puller bar	Intended primarily for use in extracting nails	...
		1	Multipurpose	Accessing tight spaces	5.7.1-2
		2	Ripping/wrecking	Heavy-duty applications	5.7.1-3
	III	...	Pry bars	Separating, prying, ripping, lifting, scraping, and aligning	...
		1	Close quarter	Limited space applications and alignment applications	5.7.2-1
		2	Die setter	Separating or prying applications; scraping or prying	5.7.3-1
		3	Handled	Separating, scraping, or prying applications	5.7.4-1
		4	Pinch	Separating, scraping, or prying applications; alignment applications	5.7.5-1
		5	Rolling head	Applications requiring leverage; alignment applications	5.7.6-1
59	I	...	Slugging wrench (straight shank)	Applications where heavy shock or impact from a hammer or sledge is required to loosen or set large nuts or fasteners. Should be used when the torquing force can be applied directly in the plane of the fastener.	5.8-1
	II	...	Slugging wrench (offset shank)	Applications where heavy shock or impact from a hammer or sledge is required to loosen or set large nuts or fasteners. Should be used when fastener clearance is restricted and the torquing force cannot be applied directly in the plane of the fastener.	5.8-1
	III	...	Striking wrench (slightly angled shank and large offset)	Applications where shock or impact from a hammer or sledge is needed to tighten or loosen nuts or fasteners. Offset allows use where fastener clearance is restricted. Should be used when the torquing force cannot be applied directly in the plane of the fastener.	5.8-2

Table 2-1 Appropriate Striking Tools

Category	Type	Appropriate Striking Tool
43	...	Sledge or woodchopper's maul
44, 48, 49	...	Hammer
46, 50	...	Ball peen, hand drilling, or engineer's hammer
52	I	Ball peen, hand drilling, or engineer's hammer
52	II, III	Not to be struck
59	...	Ball peen hammer, blacksmith's hammer, maul, or sledge

(c) for Category 46 tools, the angled flat surface or equivalent radius between the struck face and the body of the extractor encircling the perimeter of the struck face.

(d) for Category 48 tools, the angled flat surface or equivalent radius between the struck face and body of the punch or chisel encircling the perimeter of the struck face.

(e) for Category 49 tools, the angled flat surface, or equivalent radius, encircling the perimeter of the struck face and of the point end encircling the cup.

(f) for Category 50 tools, the angled flat surface or equivalent radius between the struck face and the body of the brick chisel, brick set, or star drill encircling the perimeter of the struck face.

(g) for Category 59 tools, the angled surface or equivalent radius encircling the perimeter of and breaking the sharp corners of the struck face.

chisel end: for Category 52 tools, the portion of bar having a tapered shape gradually reducing to and including the prying edge.

claw: for Category 52 tools, the nail-pulling end of the bar having a tapered V-shaped opening for gripping the nail shank.

cup: for Category 49 tools, the conical, concave relief at the center of the point end of the nail set (not normally provided on self-centering nail sets).

cup edge: for Category 49 tools, the edge formed by the intersection of the cup and the chamfer surfaces (not normally provided on self-centering nail sets).

cutting edge:

(a) for tools in Categories 44 and 48, the edge formed by the bevel directly opposite the struck face.

(b) for Category 46 tools, the edge formed by the flute.

(c) for Category 50 tools, the edge formed by the bevel or bevels at the end opposite the struck face.

equivalent: indicates alternative designs or features that will provide an equal degree of performance and safety.

eye: for Category 48 tools, an opening or aperture located in the body of the punch or chisel into which a handle is inserted.

flute:

(a) for Category 46 tools, the straight or spiral groove that forms the cutting edge of the extractor.

(b) for Category 50 tools, the rounded groove of the star drill between any two adjacent tapers extending to the body and bevels.

flute side: for Category 50 tools, the portion of the star drill adjacent to the taper and extending from the body to the bevels.

grip: for Category 52 tools, when provided, material securely attached to the body for holding during use.

grip area: for Category 52 tools, the area of the body at the end opposite the prying end or point end that the user grips to apply force.

guide grooves or wings: for Category 43 tools, when provided, the long, narrow impressions or protrusions located on opposite sides of the taper.

handheld chisel: for Category 48 tools, a chisel designed to be held by its body.

handheld punch: for Category 48 tools, a punch designed to be held by its body.

handheld star drill: for Category 50 tools, a star drill intended to be held by its body.

handle:

(a) for Category 44 tools, when provided, the portion attached to the body of glaziers' and wood chisels by which the tool is held.

(b) for Category 48 tools, the portion protruding from the punch or chisel body by which the tool is held.

(c) for Category 52 tools, the additional material securely attached to the body to be gripped during use.

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

head:

(a) for Category 43 tools, the portion of the wedge between the struck face and the taper.

(b) for Category 49 tools, the portion of the nail set between the struck face and the body.

heel: for Category 52 tools, the portion of Type I bar intended to be struck, which is the outer surface of the curved section of the bar adjacent to the claw end.

may: indicates a foreseeable or allowable nonmandatory condition.

nail-pulling slot: for tools in Categories 44 and 52, the V-shaped slot or opening designed for pulling nails.

permanent set: for Category 44 tools, the plastic deformation of the tool as measured per para. 6.5.

pin: for Category 48 tools, the straight cylindrical section of the punch between the point and taper or body.

point end:

(a) for Category 48 tools, the formed end directly opposite the struck face of the punch.

(b) for Category 52 tools, the portion of bar intended for aligning applications having a tapered round cross-sectional area.

point size: for Category 48 tools, the diameter of the point end or the diameter at the bevel/taper intersection.

prying edge: for Category 52 tools, the edge formed by the tapering of the chisel end or claw end.

prying end: for Category 52 tools, the portion of bar having a chisel end or a claw end.

punch: for Category 49 tools, the movable, struck member of a self-centering nail set.

rounded head: for tools in Categories 44, 46, 48, and 50, the equivalent design for the struck face and chamfer portion of the tool.

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

shall: indicates mandatory requirements of this Standard.

shank: for Category 59 tools, the portion of wrench between the box end and struck block.

should: indicates recommended provisions of this Standard.

side bevel: for Category 44 tools, the slanting surface on side edges that decreases blade thickness.

softwood: for Category 52 tools, the wood of a coniferous tree, e.g., fir, pine, or hemlock.

splitting edge: for Category 43 tools, the edge formed by the bevel directly opposite the struck face.

struck block: for Category 59 tools, the portion of wrench opposite the box end having a square or rectangular cross section that includes the struck faces.

struck face:

(a) for Category 43 tools, the portion of the wedge located adjacent to the head directly opposite the splitting edge.

(b) for Category 44 tools, the portion of the chisel directly opposite the cutting edge.

(c) for Category 46 tools, the portion of the extractor, directly opposite the fluted or tapered end.

(d) for Category 48 tools, the portion of the punch or chisel exclusive of the chamfer and body, directly opposite the point end; the extreme end portions of the drift pin exclusive of the body and tapers.

(e) for Category 49 tools, the end directly opposite the point end exclusive of the chamfer.

(f) for Category 50 tools, the portion of the brick chisel, brick set, or star drill exclusive of the chamfer and body, at the end opposite the cutting edge.

(g) for Category 59 tools, the surface of struck block exclusive of the chamfer that is intended to be struck with a striking tool while torquing fasteners.

struck face crown: for Category 59 tools, the convex shape or radius of the struck face (if provided).

taper:

(a) for Category 43 tools, the portion of the wedge with a gradually reducing cross-sectional area, located between the head and the bevel.

(b) for Category 44 tools, the portion of the chisel between the body and the bevel with a gradually reducing cross-sectional area.

(c) for Category 46 tools, the portion of the extractor, when provided, opposite the struck face with a gradually reducing cross-sectional area.

(d) for Category 48 tools, the portion of the punch or chisel between the body and bevel or point end with a gradually reducing cross-sectional area; the portion of the drift pin between the body and struck face with a gradually reducing cross-sectional area.

(e) for Category 49 tools, the portion of the nail set between the body and the point end chamfer having a gradually reducing cross-sectional area.

(f) for Category 50 tools, the portion of the brick chisel or brick set between the body and the bevel with a gradually reducing cross-sectional area or the portion of the star drill between the flute and the flute side extending from the body to the bevels with a gradually reducing cross-sectional area.

upset head:

(a) for Category 44 tools, 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.

(b) for Category 48 tools, the portion of the punch or chisel body having an enlarged cross-sectional area at the struck end of the tool including and underlying the struck face.

(c) for Category 50 tools, the portion of the body having an enlarged cross-sectional area at the struck end of the tool including and underlying the struck face.

3 REFERENCES

The following is a list of publications referenced in this Standard. The latest available edition shall be used.

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 B107.17, Gages and Mandrels for Wrench Openings
ASME B107.100, Wrenches
Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ASTM A29/A29M, Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
ASTM A322, Standard Specification for Steel Bars, Alloy, Standard Grades
ASTM A331, Standard Specification for Steel Bars, Alloy, Cold-Finished
ASTM A576, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM A681, Standard Specification for Tool Steels Alloy
ASTM E18, Standard Test Methods for Rockwell Hardness and Rockwell Superficial 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 of struck tools are shown in Table 1-1 and the applicable figures indicated therein. Additional common names and styles are in para. 5.1.

5 PERFORMANCE REQUIREMENTS

The figures in this section are descriptive and nonrestrictive and not intended to preclude the manufacture of struck tools that otherwise comply with this Standard.

Dimensions in tables are in inches, unless otherwise specified.

Struck tools shall pass the applicable tests in section 6.

5.1 Design: Category 43 Wood-Splitting Wedges

Wood-splitting wedges shall have a splitting edge and taper for splitting wood and a struck face to be struck by an appropriate striking tool as listed in Table 2-1.

Typical styles of wood-splitting wedges are shown in Figures 5.1-1 through 5.1-3, and their uses are listed in the following table. The names are those generally recognized; however, styles are not limited to those named or illustrated.

Style	Applications
Square head	Splitting logs and wood products
Oregon-splitting	Splitting logs and wood products
Stave wedge	Splitting narrow strips of wood, such as barrel staves

5.2 Design: Category 44 Chisels — Glaziers', Wood, Ripping, Flooring/Electricians'

Chisels shall have a cutting edge on one end and a struck face on the opposite end (see Figures 5.2-1 through 5.2-5).

5.3 Design: Category 46 Stud, Screw, and Pipe Extractors

Extractors shall have a straight or tapered fluted portion at one end for engaging and removing broken fasteners and pipes of materials that are softer than the extractor. The opposite end shall have a struck face (see Figures 5.3-1 through 5.3-4).

(a) The body portion of the extractor shall have a square, hexagonal, or other shape suitable for turning the extractor with a wrench over all or part of its length.

(b) The flutes shall be on the straight or tapered portion of the extractor and of any shape that presents sharp edges suitable for cutting into the hole in the pipe or fitting, or a hole drilled into the fastener when the extractor is struck with an appropriate hammer. Spiral flutes, when present, shall be of a left-hand thread orientation (for right-hand fastener threads), so that when the extractor is engaged with the pipe, fitting, or fastener and turned counterclockwise with a wrench, the extractor tends to further engage while the part to be extracted is removed.

5.4 Design: Category 48 Metal Chisels, Punches, and Drift Pins

5.4.1 Type I Chisels. Chisels shall have a cutting edge at one end for cutting, shaping, and removing metal 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 an appropriate striking tool. Handles may be of any design and shall be inserted securely into the chisel and permit the chisel to be held over the work (see Figures 5.4.1-1 and 5.4.1-2).

5.4.2 Type II Punches. Punches shall have a point end and a struck face on the opposite end. Type II, Class 1 and Type II, Class 7 handles may be of any design and shall be inserted securely into the punch and permit the punch to be held over the work without exposing the user to personal injury (see Figures 5.4.2-1 and 5.4.2-2).

5.4.3 Type III Drift Pins. Drift pins shall taper to a convex struck face at each end (see Figure 5.4.3-1).

5.5 Design: Category 49 Nail Sets

5.5.1 Type I. Nail sets shall have a chamfer and cup surface on the point end and a struck face on the opposite end (see Figure 5.5.1-1).

5.5.2 Type II. Self-centering nail sets shall have a body with an internal movable punch. A cup point may be provided on the punch point end. A return method shall be provided to hold the punch in the retracted position (see Figure 5.5.2-1).

5.6 Design: Category 50 Brick Chisels, Brick Sets, and Star Drills

(a) Brick chisels and brick sets shall have a cutting edge on one end and a struck face on the opposite end to be struck by an appropriate striking tool.

(1) Brick chisels shall be designed for cutting brick and masonry block and shall have two bevels that create the cutting edge (see Figures 5.6-1 and 5.6-2).

(2) Brick sets shall be designed for scoring, adjusting, and trimming brick and masonry block and shall have a single bevel that creates the cutting edge (see Figures 5.6-1 and 5.6-2).

(b) Star drills shall have four cutting edges at one end for use in drilling holes in brick, tile, concrete, and stone and a struck face on the opposite end to be struck by an appropriate striking tool. Star drills may be relieved from the cutting edges to permit ejection of dust and debris from the hole being drilled (see Figure 5.6-3).

5.7 Design: Category 52 Nail-Puller Bars and Pry Bars

5.7.1 Nail-Puller Bars. Types I and II nail-puller bars shall be provided with a slotted claw, at one or both ends of the bar, suitable for pulling nails.

(a) Type I nail-puller bars shall be provided with one or more struck surfaces (see Figure 5.7.1-1).

(b) Type II nail-puller bars shall be provided with no struck surfaces. Class 1 multipurpose bars are generally flat and thin for accessing tight spaces (see Figure 5.7.1-2). Class 2 ripping/wrecking bars are heavy-duty tools with a prying end and a nail-pulling end (see Figure 5.7.1-3).

5.7.2 Type III, Class 1 Close Quarter. Pry bars shall have a sharply bent chisel end providing leverage in limited space applications and a point end for alignment applications (see Figure 5.7.2-1).

5.7.3 Type III, Class 2 Die Setter. Pry bars shall have a bent half-loop chisel end for separating or prying applications and a straight chisel end for scraping or prying (see Figure 5.7.3-1).

5.7.4 Type III, Class 3 Handled. Pry bars shall have a slightly bent chisel end for separating, scraping, or prying applications and a handle (see Figure 5.7.4-1).

5.7.5 Type III, Class 4 Pinch. Pry bars shall have a slightly bent chisel end for separating, scraping, or prying applications and a point end for alignment applications (see Figure 5.7.5-1).

5.7.6 Type III, Class 5 Rolling Head. Pry bars shall have a formed, rounded chisel end that acts as a fulcrum to provide leverage and a point end for alignment applications (see Figure 5.7.6-1).

5.8 Design: Category 59 Slugging and Striking Wrenches

Slugging and striking wrenches (see Figures 5.8-1 and 5.8-2) shall have a box end for turning fasteners, a shank, and a block at the opposite end to be struck by an appropriate striking tool (see Figure 5.8-3). Slugging wrenches generally have thicker cross sections than striking wrenches and are intended for withstanding heavier blows. Wrench openings shall be such as to ensure acceptance when gaged with gages conforming to ASME B107.17.

5.9 Struck Face (All Except Category 48 Type III and Category 52)

Each struck face shall have a crowned or a flat surface with a chamfer of approximately 45 deg or equivalent radius all around the perimeter having a width approximately equal to one-tenth of the dimension shown in Table 5.9-1. For example, if the struck face width of a Category 59 wrench is 1.00 in., then the chamfer width would be approximately 0.10 in.

Struck faces shall be designed to be struck by the appropriate striking tool (see Table 2-1).

5.10 Materials

(a) Category 50 brick chisels, brick sets, and star drills shall be made from special-quality, fine-grain, hot-rolled or cold-finished carbon or alloy steel bars, or from an equivalent material, having good wear-resisting and shock-resisting qualities and conforming to any of the following standards: ASTM A29/A29M, ASTM A322, ASTM A331, ASTM A576, or ASTM A681.

(b) The materials used in the manufacture of all other categories of struck tools shall be such as to produce tools conforming to the requirements of this Standard.

5.11 Hardness

Hardness requirements are shown in Table 5.11-1.

5.12 Finish (Categories 48 and 50)

Surfaces shall have a rust preventive treatment. When provided, coatings shall be adherent, smooth, continuous, and free from any conditions that would interfere with their protective value, safety, and function.

5.13 Marking

Marking shall be as permanent as the normal life expectancy of the tool to which it is applied (providing the marked surface has not been subjected to a fretting or abrading action) and shall withstand the cleaning procedures normally experienced during the tool's intended use (see also para. 7.1.3).

(a) Category 48 and 50 tools shall be marked in a plain and permanent manner with the manufacturer's name or a trademark of such known character that the source of manufacture shall be readily determined.

(b) Category 48 tools shall also be marked with nominal size.

(c) Category 59 tools shall be marked in a plain and permanent manner with the nominal wrench opening.

Figure 5.1-1 Category 43 Wood-Splitting Wedges

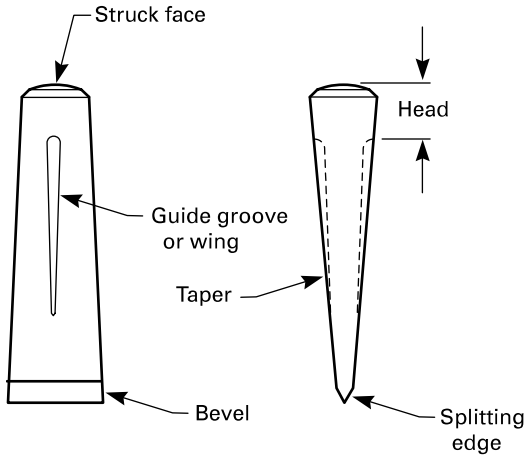


Figure 5.1-2 Category 43 Square Head Wedges

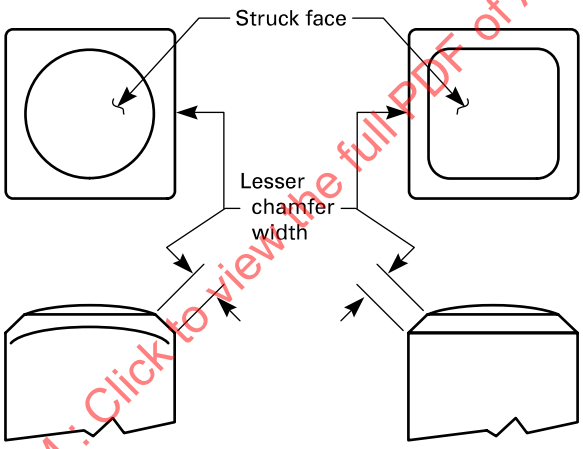
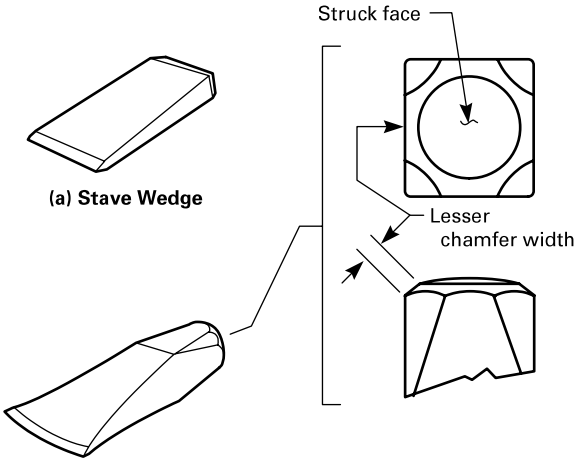


Figure 5.1-3 Category 43 Stave and Oregon-Splitting Wedges



(a) Stave Wedge

(b) Oregon-Splitting Wedge

Figure 5.2-1 Category 44 Glaziers' Chisels

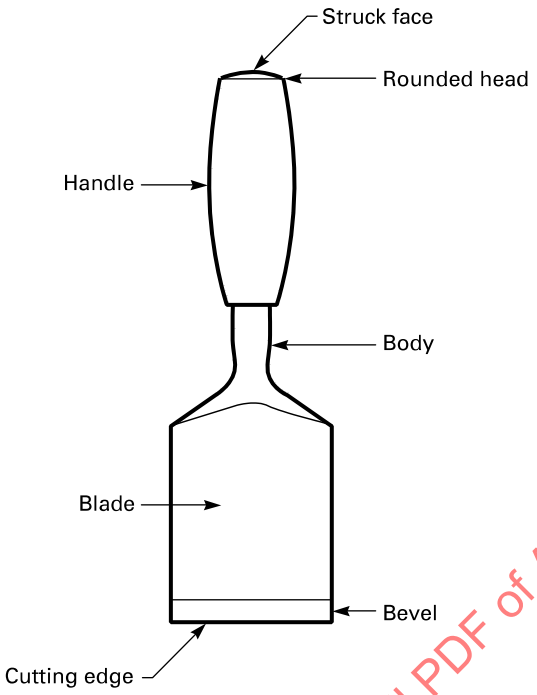


Figure 5.2-2 Category 44 All-Steel Wood Chisels

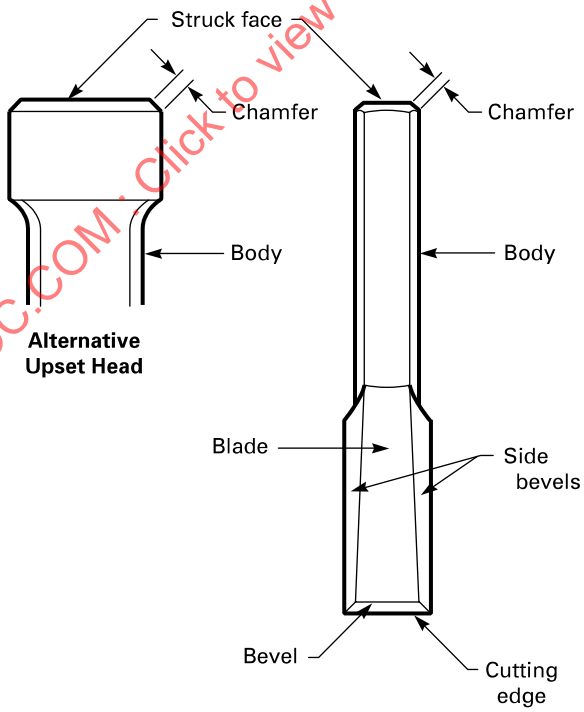


Figure 5.2-3 Category 44 Wood Chisels

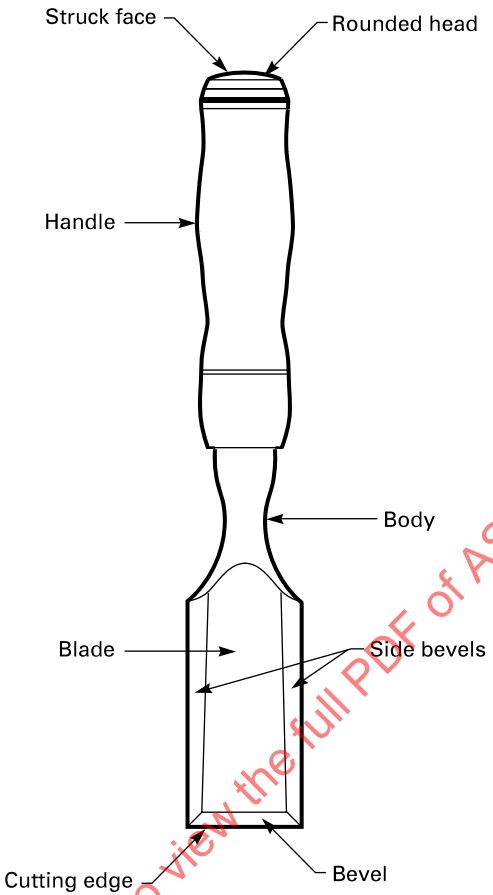


Figure 5.2-4 Category 44 Ripping Chisels

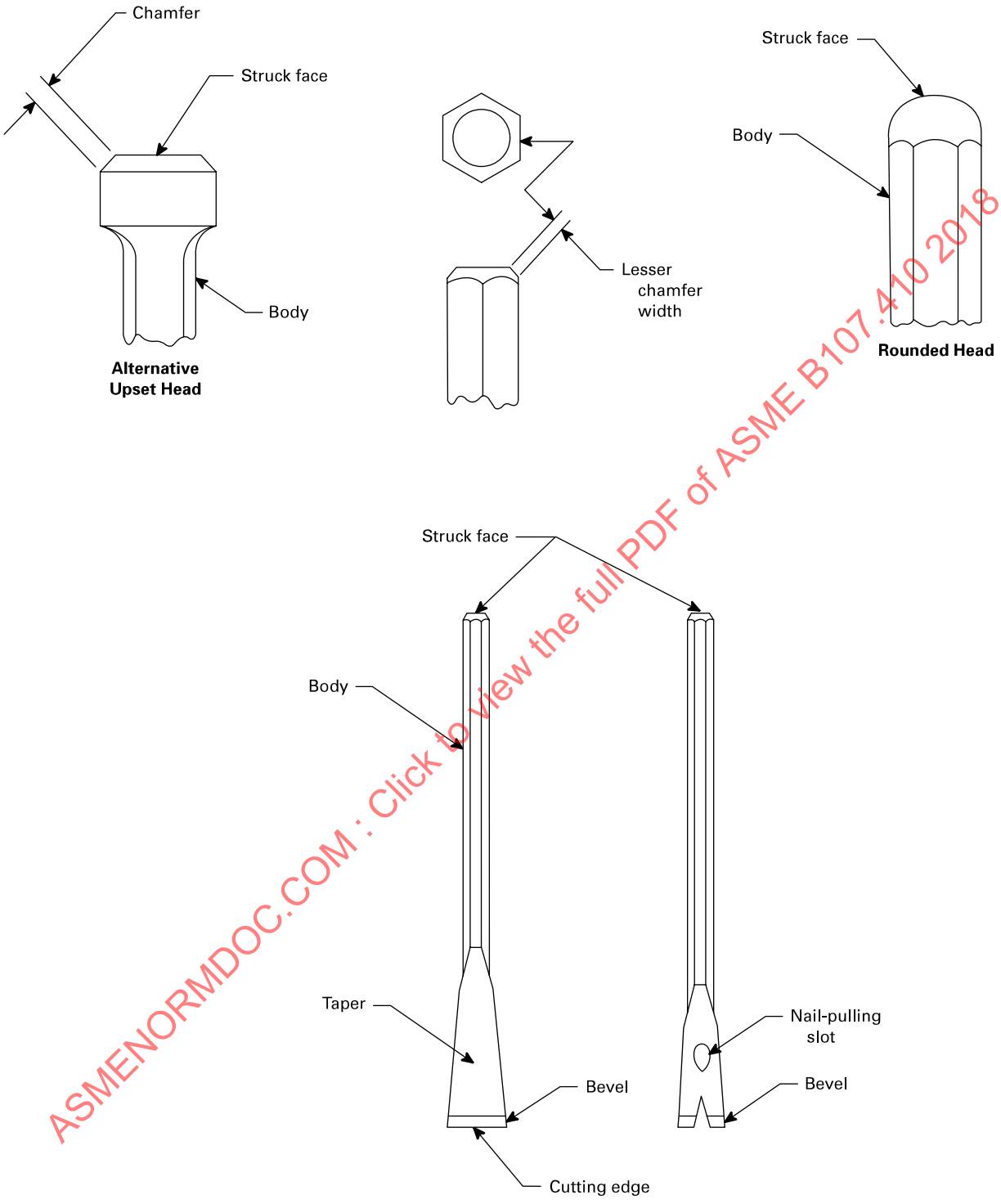


Figure 5.2-5 Category 44 Flooring/Electricians' Chisels

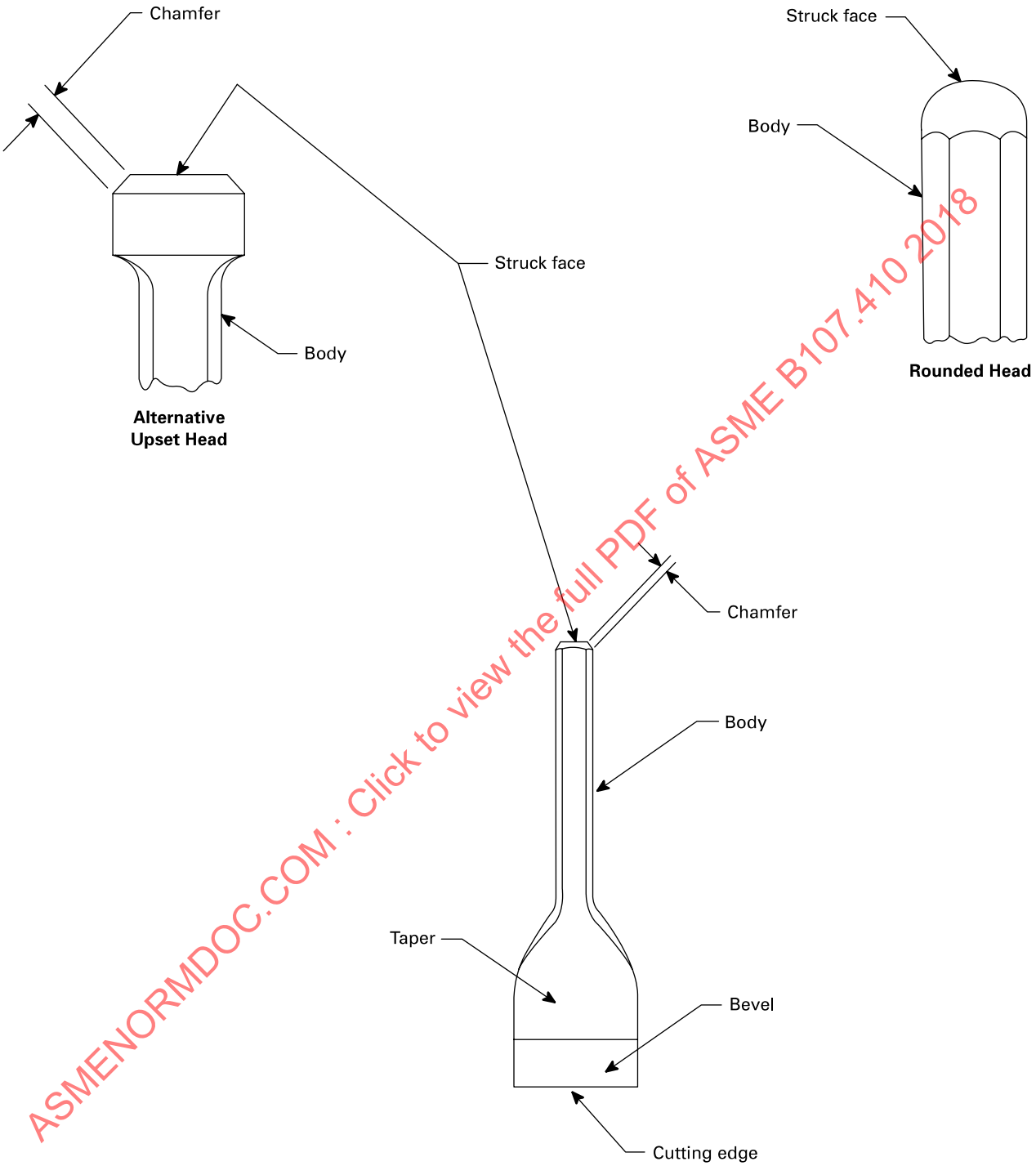


Figure 5.3-1 Category 46 Multi-Spline Extractor

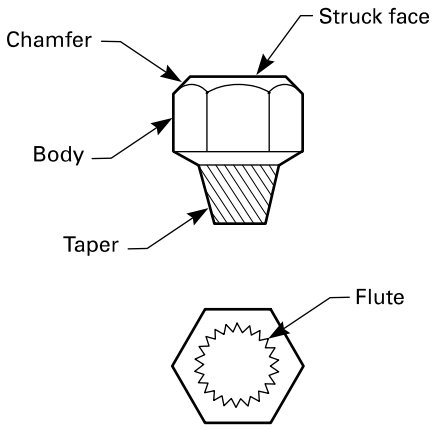


Figure 5.3-2 Category 46 Spiral Flute Extractor

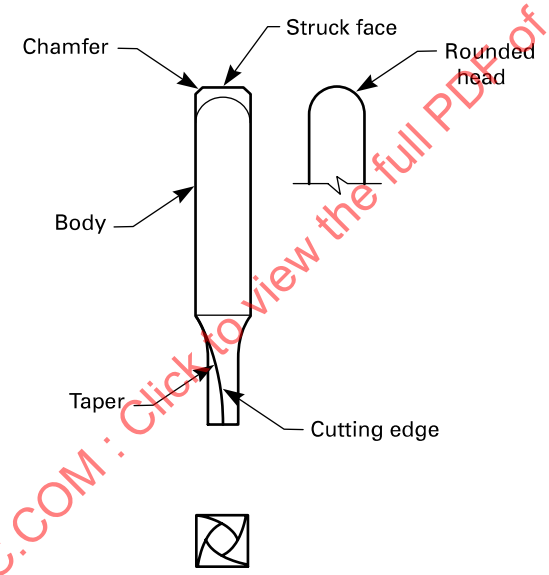


Figure 5.3-3 Category 46 Straight Flute Extractor

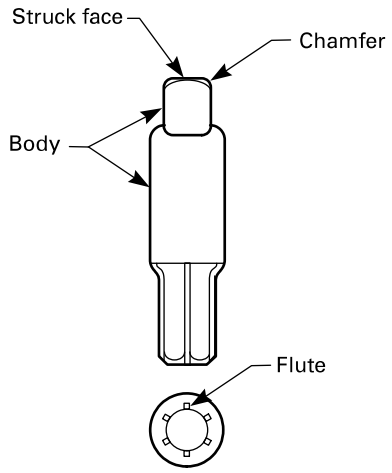


Figure 5.3-4 Category 46 Tapered Flute Extractor

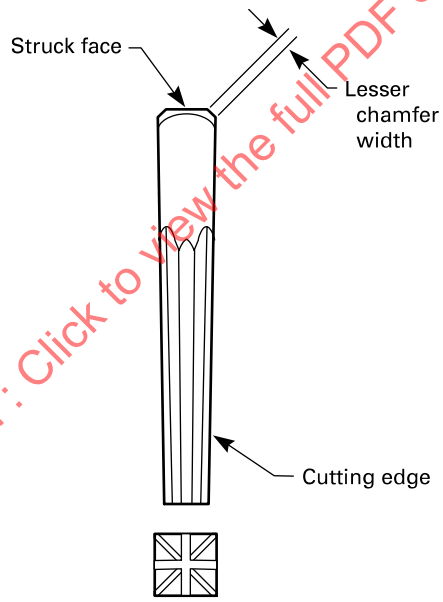


Figure 5.4.1-1 Category 48 Type I Chisels

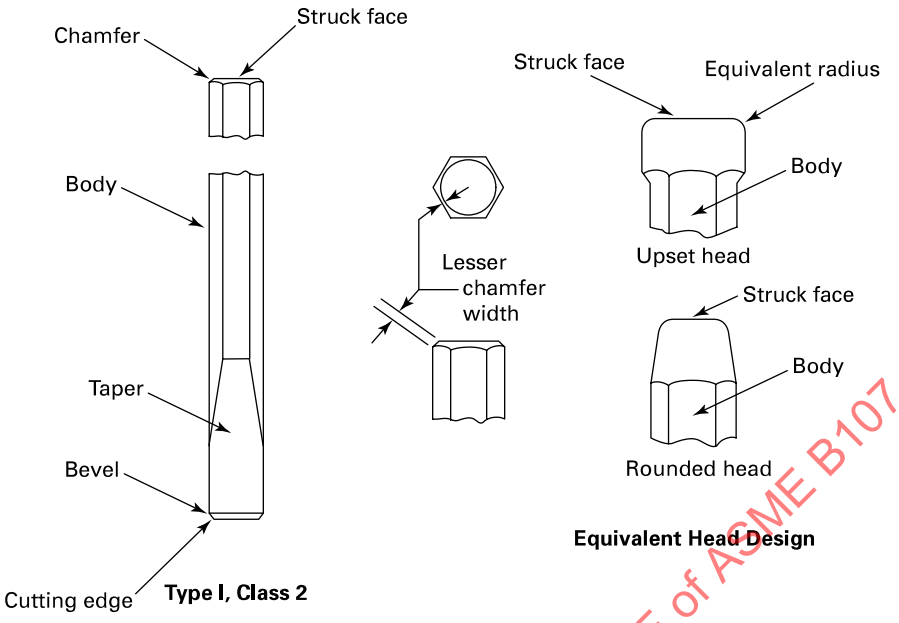
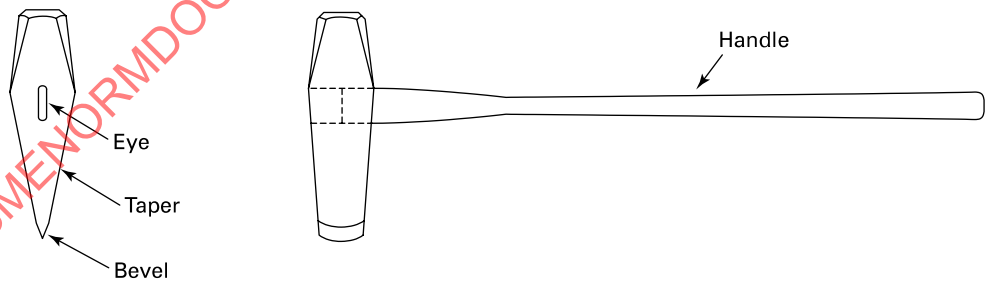


Figure 5.4.1-2 Category 48 Type I Handle-Held Chisels



Type I, Class 6

Figure 5.4.2-1 Category 48 Type II Punches

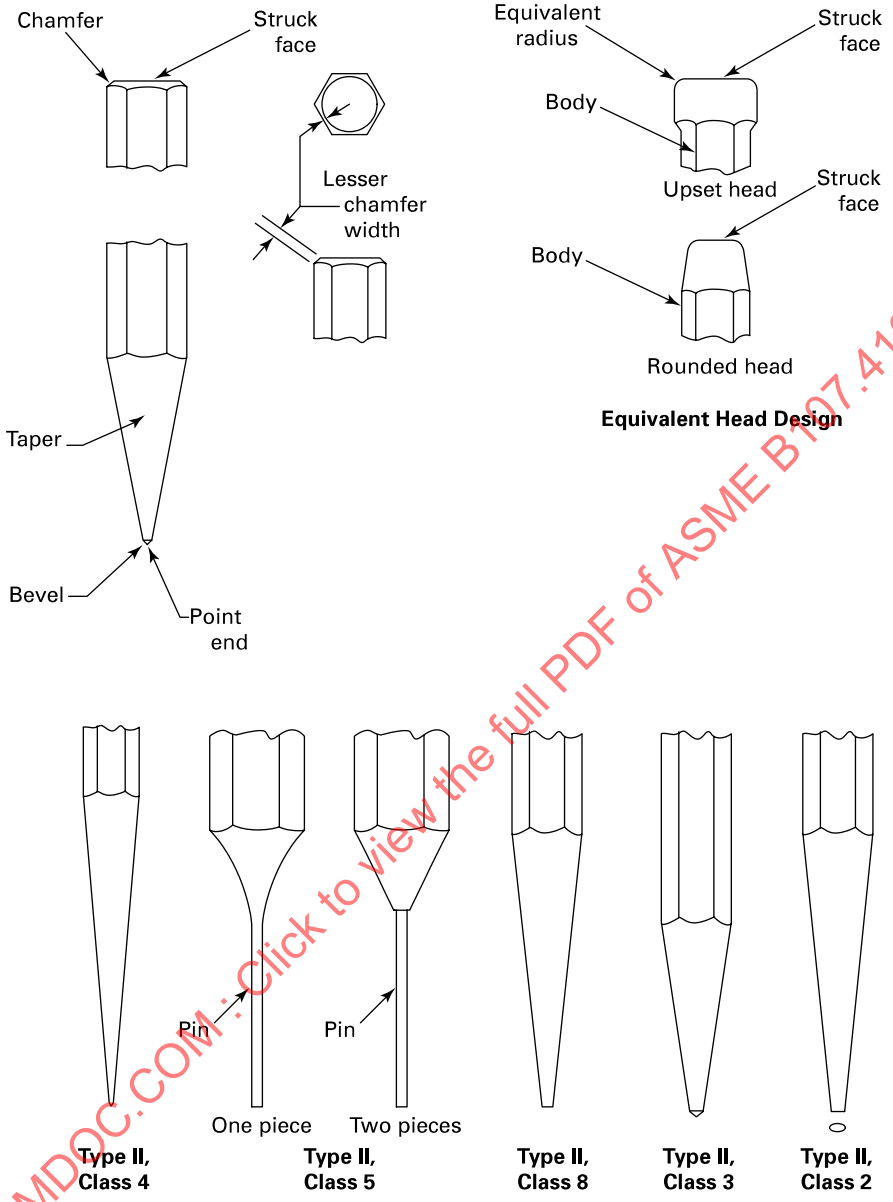
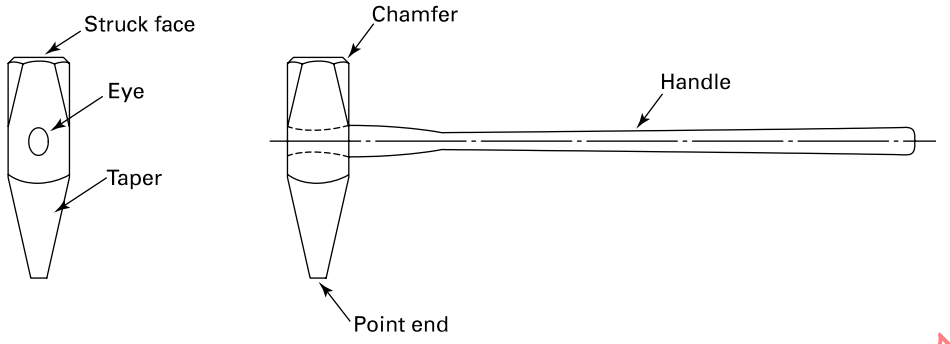
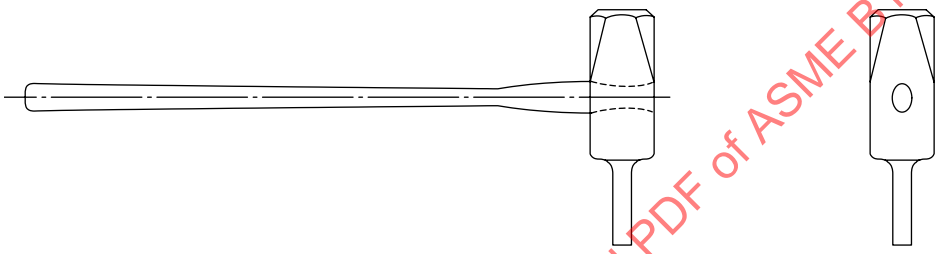


Figure 5.4.2-2 Category 48 Type II Handle-Held Punches

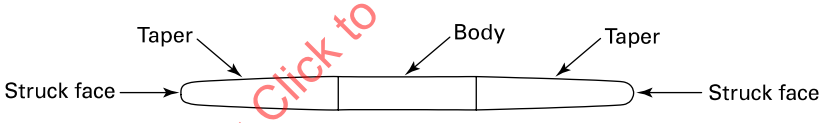


Type II, Class 7



Type II, Class 1

Figure 5.4.3-1 Category 48 Type III Drift Pins



Type III

Figure 5.5.1-1 Category 49 Type I Nail Set

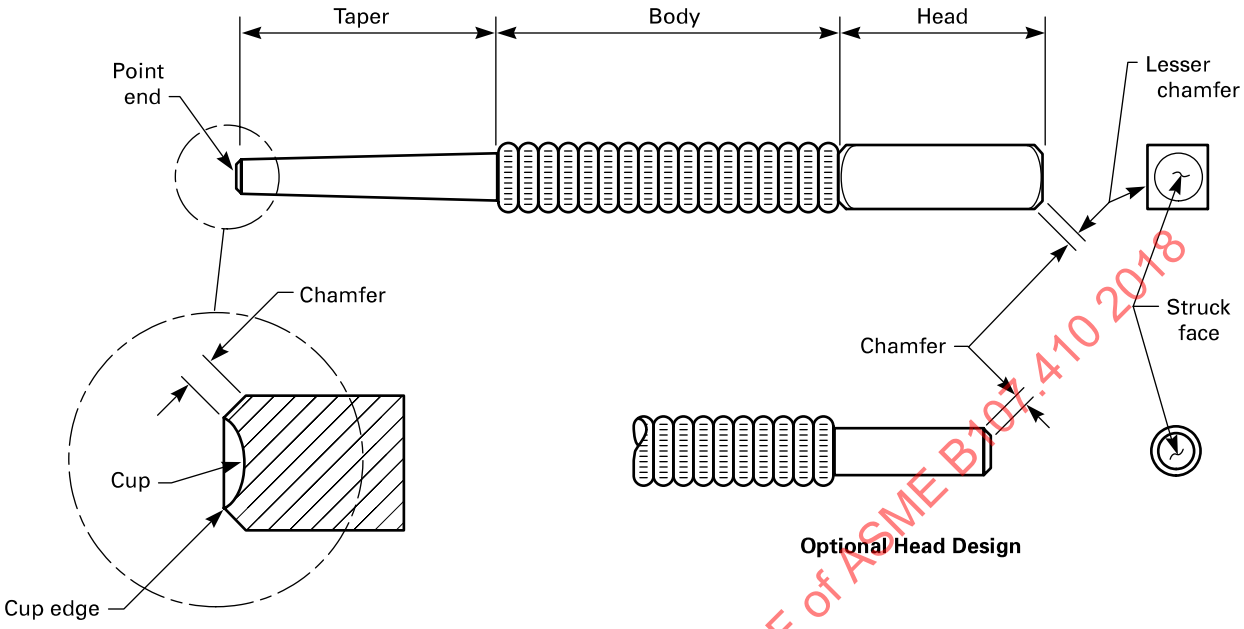


Figure 5.5.2-1 Category 49 Type II (Self-Centering) Nail Set

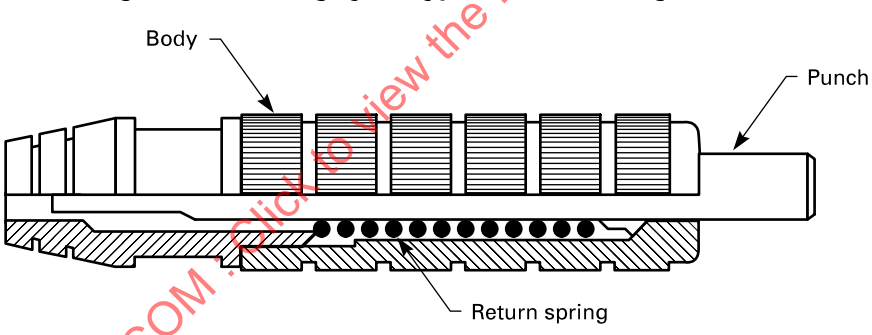


Figure 5.6-1 Category 50 Brick Chisel and Brick Set

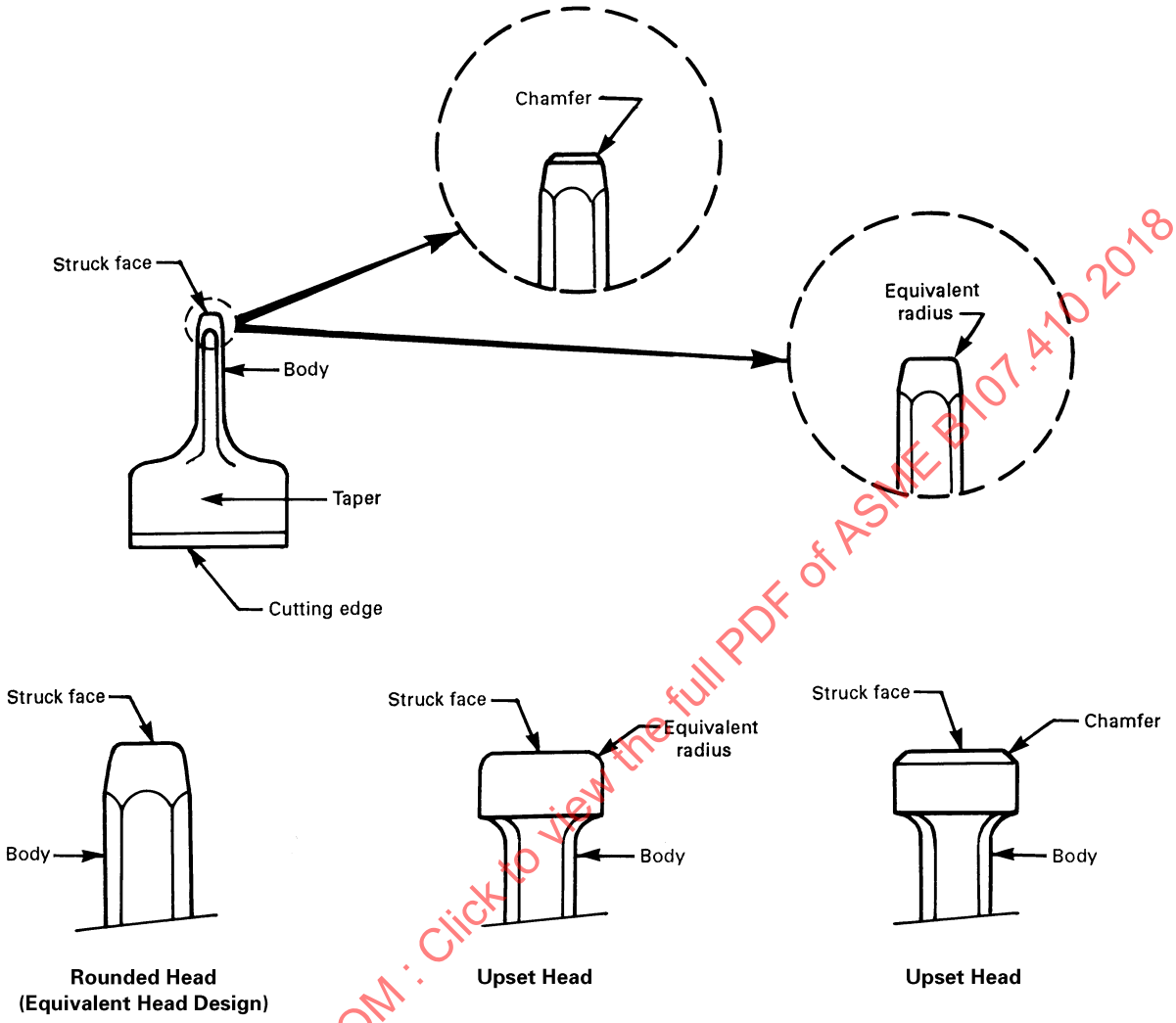


Figure 5.6-2 Configuration of Category 50 Brick Chisel and Brick Set Bevels

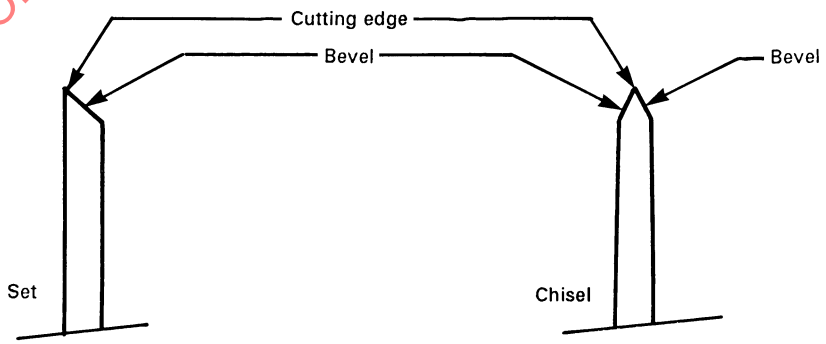


Figure 5.6-3 Category 50 Star Drill

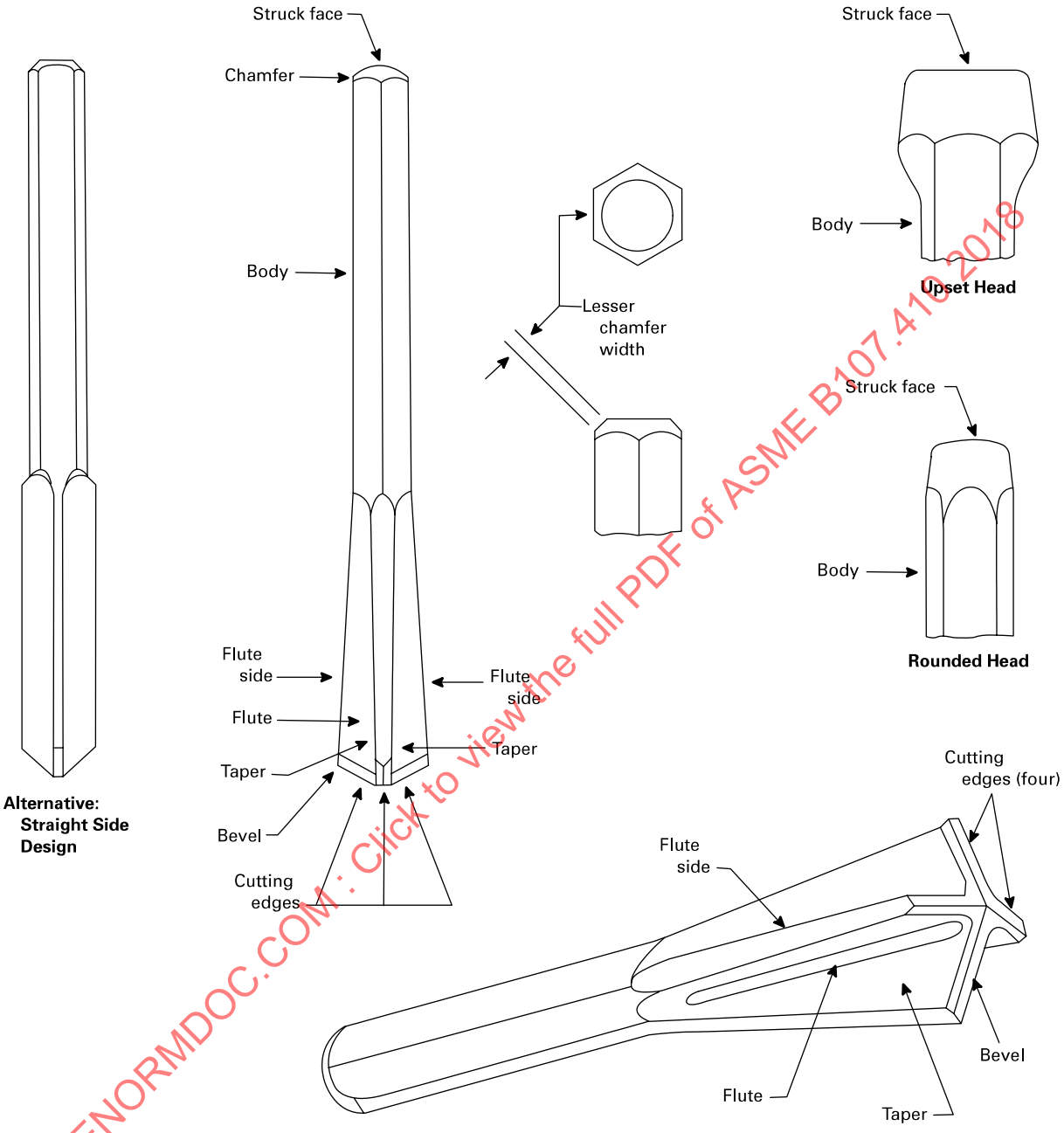
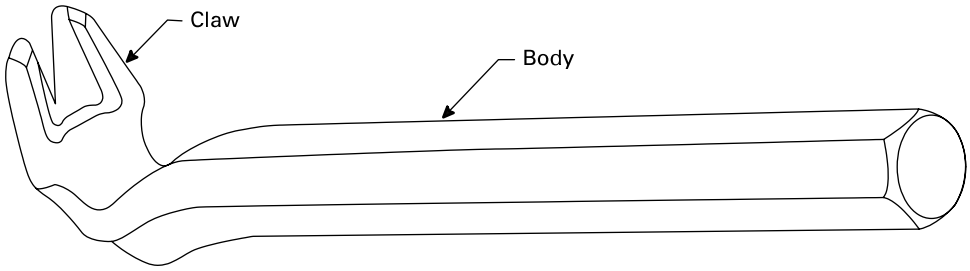
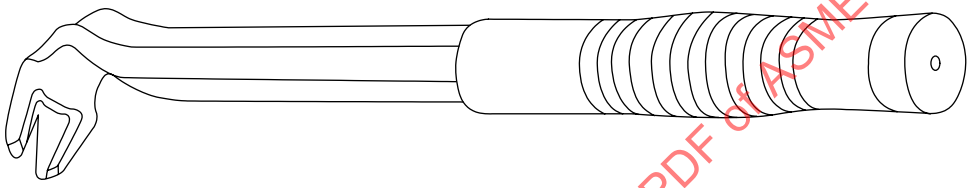


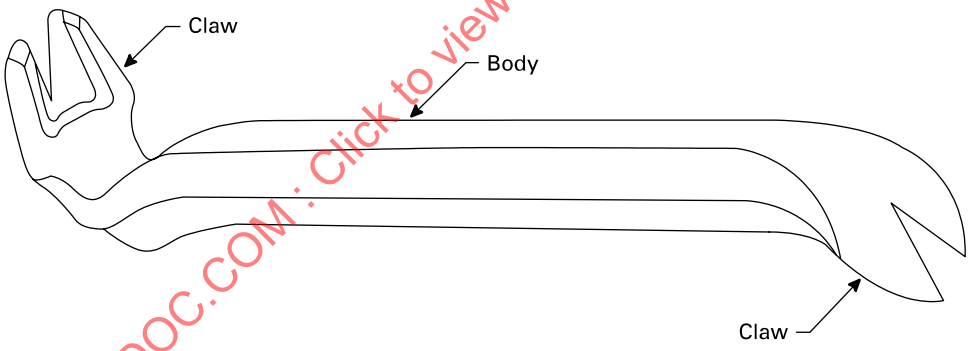
Figure 5.7.1-1 Category 52 Type I Struck Nail-Puller Bars



(a) Single Claw Without Grip



(b) Single Claw With Grip



(c) Double Claw

Figure 5.7.1-2 Category 52 Type II, Class 1 Nonstruck Multipurpose Bar

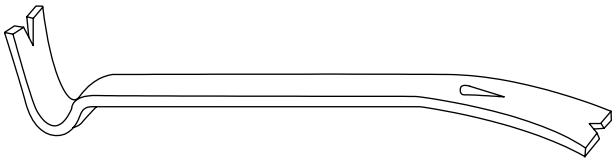


Figure 5.7.1-3 Category 52 Type II, Class 2 Nonstruck Ripping/Wrecking Bar

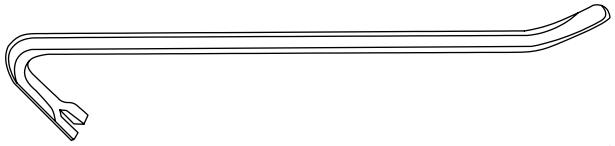


Figure 5.7.2-1 Category 52 Type III, Class 1 Close Quarter Pry Bar

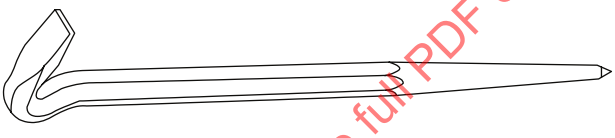


Figure 5.7.3-1 Category 52 Type III, Class 2 Die Setter Pry Bar

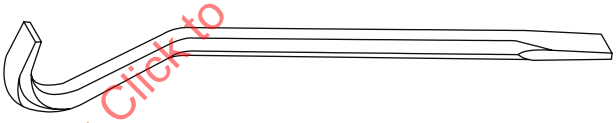


Figure 5.7.4-1 Category 52 Type III, Class 3 Handled Pry Bar

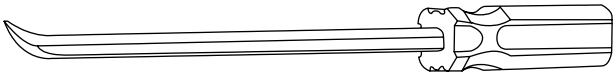


Figure 5.7.5-1 Category 52 Type III, Class 4 Pinch Bar

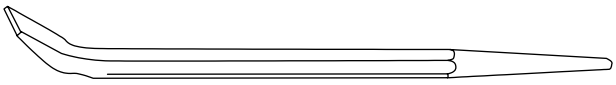


Figure 5.7.6-1 Category 52 Type III, Class 5 Rolling Head Pry Bar

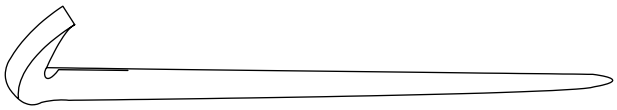


Figure 5.8-1 Category 59 Striking Wrenches

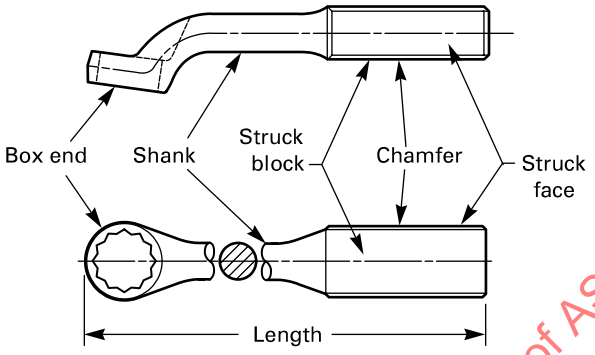


Figure 5.8-2 Category 59 Slugging Wrenches

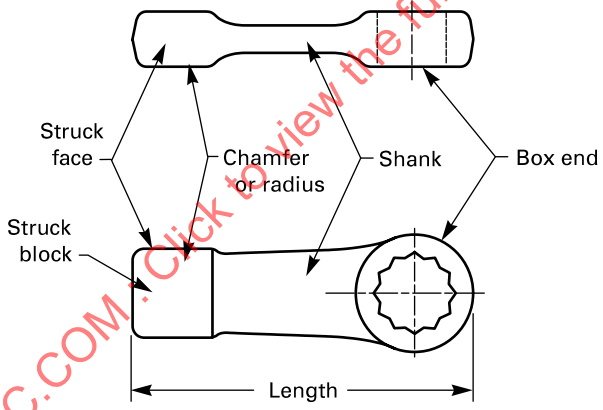


Figure 5.8-3 Struck Block Cross Section

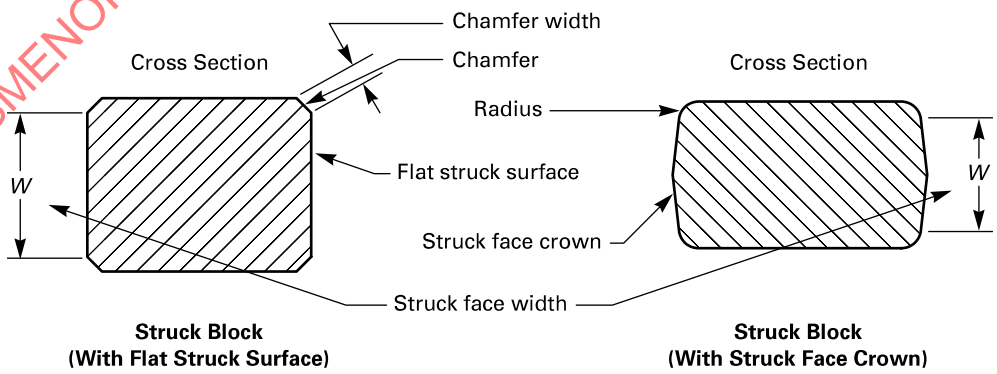


Table 5.9-1 Striking Face and Chamfer

Category	10% of
43	Minimum head width
44	Body stock size (see Figure 5.2-2)
46	Body stock size
48 Types I and II	Body stock size (see Figures 5.4.1-1 and 5.4.2-1)
49	Diameter of the struck face (see Figure 5.5.1-1)
50	Diameter of the material behind the struck face (see Figure 5.6-1)
59	Struck face width (see Figure 5.8-3)

Table 5.11-1 Hardness Requirements

Category	Type	Struck Face, HRC	Surface	Hardness, HRC	Distance, min.	From
43	...	...	Entire tool	35	...	...
44	I, II	44	...	53–62	0.25	Cutting edge
44	III, IV	44	...	30–52	0.25	Cutting edge
46	...	43	Cutting edge	45–60	...	...
48	I	44	...	53–60	0.25	Cutting edge
48	II	44	...	48–60	0.25	Point end
49	...	44	...	48–60	0.125	Point end
50	...	45	...	45	1.00	Struck face
50	I, II	...	...	35–55	0.25	Cutting edge
50	III	...	...	53–60	0.62	Cutting edge
52	I	...	All except heel	55	...	...
52	I	...	Heel	44	...	...
52	II	...	Entire tool	48	...	...
52	III	...	Entire tool	50	...	...
59	...	...	Entire tool	44	...	...

GENERAL NOTE: A single HRC value is a maximum.

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 manner inconsistent with safe use of the tools. Tests shall be conducted at a temperature between 40°F and 90°F. Separate (new) tools shall be used for each test. Failure to meet the requirements of any applicable test indicates that the tools do not comply with this Standard.

6.1 Hardness Determination Test

Hardness determination shall be made in accordance with ASTM E18.

6.2 Impact Tests

6.2.1 Category 43. The wedge shall be vertically mounted and supported with the splitting edge resting directly on a mild steel plate of not less than 0.75 in. (19.1 mm) thickness. The steel plate shall be rigidly supported on an anvil or other similar device of sufficient mass to resist deflection. Prior to conducting this test, care should be taken to blunt the splitting edge to ensure that the impact energy is not expended in deformation of the splitting edge. A steel weight of 10 lb (4.5 kg) with a striking face hardness of 45 HRC to 60 HRC shall be dropped unrestricted from a height of 5.0 ft (1.5 m) onto the wedge a minimum of five times. Typically, the weight is cylindrical and dropped through a seamless tube slightly larger than the diameter of the weight. The weight shall be dropped in such a manner that each drop applies the full force squarely to the struck face of the wedge. The struck face shall not crack or chip. Normal deformation of the struck face shall be permitted.[1]

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

6.2.2 Category 44 Types I and II Chisels. Chisels shall be mounted vertically with the cutting edge resting on a hardwood test dowel and oriented at 90 deg to the axis of the dowel (rod). The chisel should be retained in a vertical position with a snug-fitting fixture permitting unrestricted vertical movement in response to the impact of the drop weight on the chisel struck face. The dowel shall have a diameter of 1 in. and shall be made of hardwood, such as maple, birch, or beech. The dowel with its end grain perpendicular to the cutting edge (see Figure 6.2.2-1) shall rest on a solid foundation, such as a steel block, weighing not less than 20 lb. A 10-lb cylindrical steel weight, with a striking face hardness of 45 HRC to 60 HRC, shall be dropped 20 times (through seamless tubing slightly larger than the diameter of the weight) onto the chisel struck face from the height indicated in the following table. The test dowel shall be moved after each drop of the weight to make a new impression. The diameter of the striking face of the weight shall be less than 0.375 in. larger than the struck face of the chisel.

Cutting Edge Width, in.	Drop Height, in.
<0.50	6
≥0.50 and <1.00	12
≥1.00	16

There shall be no chipping, cracking, or spalling of either the cutting edge or the struck face, or cracking or bending of the chisel. There shall be no deterioration of the handle. Normal deformation at either end is permitted.[2]

6.2.3 Category 44 Types III and IV Chisels. The chisel shall be mounted vertically with the cutting edge resting on a steel bar. The chisel shall be retained in a vertical position with a snug-fitting fixture permitting unrestricted vertical movement in response to the impact of the drop weight on the chisel struck face. The bar shall have a minimum thickness of 0.75 in. and a width of at least 0.25 in. greater than the width of the chisel-cutting edges. The bar shall be mild steel (UNS G10180–G10300) and have a uniform hardness of 80 HRB to 85 HRB. The bar shall rest on a solid foundation, such as a steel block, weighing 20 lb or greater. A 5-lb cylindrical weight with a striking face hardness of 45 HRC to 60 HRC shall be dropped 20 times (through seamless tubing slightly larger than the diameter of the weight) from a height of 10 in. onto the chisel struck face. The diameter of the striking face of the weight shall not be less than 0.375 in. larger than the struck face of the chisel. The test bar shall be moved after each drop of the weight to make a new impression. There shall be no chipping, cracking, or dulling of the cutting edge; no mushrooming or chipping of the struck face; and no bending of the chisel. Normal deformation at either end is permitted.[2]

6.2.4 Category 46. The extractor shall be mounted vertically in a hole in a steel plate. The hole diameter shall be equal to the drill size recommended by the extractor manufacturer, and the depth shall be sufficient to prevent bottoming out. The steel plate shall be at least 1 in. thick and shall be of medium carbon alloy steel heat treated to 35 HRC to 40 HRC. A steel weight, having a striking face hardness of 45 HRC to 60 HRC and having weight as specified in Table 6.2.4-1, shall be dropped 20 times from the height indicated in Table 6.2.4-1 squarely onto the extractor struck face. The diameter of the striking face of the weight shall not be less than 0.375 in. larger than the struck face of the extractor. Typically, the weight is cylindrical and dropped through a seamless tube slightly larger than the diameter of the weight. The extractor shall not chip, spall, crack, or bend when subjected to this test. Normal deformation of the struck face and cutting edges is permitted.[2]

6.2.5 Category 48. Impact tests are conducted by mounting the subject tool vertically with the cutting edge, point end, or drift pin struck face resting against the test object. For chisels, the test object shall be a steel bar as specified in Table 6.2.5-1. For punches and drift pins, the test object shall be a steel plate of the hardness specified in Tables 6.2.5-2 and 6.2.5-3, respectively. The test object shall rest on a steel block weighing not less than 200 lb. A test weight having a diameter not less than 0.375 in. larger than the struck face of the tool being tested shall be dropped from the height and for the number of hits specified in the appropriate table (Table 6.2.5-1, 6.2.5-2, or 6.2.5-3) for the type of tool. The test weight shall have a striking face hardness of 45 HRC to 60 HRC or equivalent and shall be dropped squarely onto the subject tool's struck face. The test object shall be moved after each drop of the weight. There shall be no chipping or spalling of the cutting edge, point end, or struck face and no cracking of the chisel, punch, or drift pin as a result of the test. Normal deformation at either end is permitted.[3]

6.2.6 Category 49. The nail set shall be mounted vertically with the point end resting on a steel plate that is on a rigidly supported steel block weighing not less than 200 lb. A weight of 1.0 lb having a striking face hardness of 45 HRC to 60 HRC or equivalent shall be dropped, unrestricted 20 times in such a manner that each drop applies the full force of the weight

[2] This test is so severe that a degree of permissible deformation, such as 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.

[3] The striking test is so severe that a degree of permissible deformation, such as denting of the struck face and bending of pin or taper, can be anticipated. A much less severe test would avoid this, but it would not provide the level of safety assurance desired.

squarely to the struck face. Typically, the weight is cylindrical and dropped through a seamless tube or pipe slightly larger in diameter than the weight. For nail sets with a point diameter up to 0.063 in., the weight shall be dropped from a height of 10.0 in. For point diameters greater than 0.063 in., the weight shall be dropped from a height of 18.0 in. The test plate shall have a minimum thickness of 0.25 in. with a uniform hardness of 25 HRC to 30 HRC or equivalent and shall be moved after each drop of the weight to make a new impression. The point end or struck face shall neither chip nor spall, and the nail set shall neither crack nor bend as a result of the test. Normal deformation at either end is permitted.[4]

6.2.7 Category 50. There shall be no chipping, spalling, cracking, dulling, or turning of the cutting edge; no mushrooming or chipping of the head (struck face); and no bending of the tool when tested according to the following procedure. Normal deformation at either end of the tool is permitted.[4]

6.2.7.1 Type I Brick Chisels. The brick chisel shall be mounted vertically with the cutting edge resting crosswise on the largest surface of a rectangular common brick having a minimum thickness of 2.0 in. and a width of at least 3.0 in. The brick shall rest on a solid foundation that supports the entire brick surface, such as a block weighing not less than 10.0 lb. A steel weight of 5.0 lb and having a striking face hardness of 45 HRC to 60 HRC or equivalent shall be dropped 20 times from a height of 10.0 in. squarely onto the chisel struck face. The diameter of the striking face of the weight shall not be less than 0.375 in. larger than the struck face of the chisel. Typically, the weight is cylindrical and dropped through a seamless tube slightly larger than the diameter of the weight. The test brick shall be moved after each drop of the weight to make a new impression.

6.2.7.2 Type I Brick Chisels. The impact test for brick sets shall be the same as the test in para. 6.2.7.1, except that the weight shall be dropped ten times.

6.2.7.3 Type II Brick Sets. The star drill shall be mounted vertically with the cutting edges resting on solid concrete. The struck face of the star drill shall be struck repeatedly by a hammer of the appropriate type and size until a hole of 0.5 in. ± 0.1 in. in depth has been attained. The star drill should be rotated slightly after each successive hit. Three holes shall be drilled.

6.2.8 Category 52 Tools With Handles. The test plate shall have a hardness of 45 HRC to 50 HRC and shall rest on a solid foundation. The striking weight shall fall freely through a seamless tube having an inner dimension slightly larger than the weight. The striking face of the weight shall have a minimum hardness of 54 HRC. Impact each sample 20 times. Assembled pry bar handles shall not break, crack, nor significantly distort, which, for the purpose of this test, means an increase of at least 5% in the handle diameter, either as a uniform or an irregular bulge (see Table 6.2.8-1 and Figure 6.2.8-1).

6.2.9 Category 59. Sample wrenches shall be subjected to the impact test in para. 6.2.9.1 or para. 6.2.9.2, depending on the style of wrench. All three wrenches shall be evaluated at the conclusion of the test. The struck block of the wrenches shall not crack or chip. There shall be no visible bending of the shank or twisting of the box ends in excess of 5 deg. There shall be no cracks evident on any portion of the wrenches. The wrench openings shall not slip on the mandrel. Normal deformation of the struck face and the box end of the wrenches is permitted.[5]

6.2.9.1 Type I Slugging Wrench. Three samples of the same style and size slugging wrench shall be mounted on a hexagonal mandrel with the middle wrench offset 30 deg with respect to the other wrenches. The hexagonal mandrel shall meet the requirements of ASME B107.100, as applicable. Steel shims 0.25 in. thick shall be placed under the heads of the two wrenches on the ends of the mandrel and the assembly clamped at each of these heads to a rigidly supported steel block weighing not less than 400 lb. The drop weight shall have a striking face hardness of not less than 45 HRC or equivalent nor more than 60 HRC or equivalent and shall be dropped squarely onto the struck face of the middle wrench. The striking face diameter of the drop weight shall not be less than 0.375 in. larger than the struck face width of the wrench being struck (see Figure 5.8-3). Typically, the drop weight is cylindrical and dropped through a seamless tube slightly larger in diameter. Drop weights and drop heights are listed in Table 6.2.9.1-1. The drop weight shall be dropped 100 times onto the struck face of the middle wrench (see Figure 6.2.9.1-1 for illustration of impact test setup). Alternate methods of striking the wrench may be used if the required impact energy in Table 6.2.9.1-1 is satisfied.

[4] The striking test is so severe that a degree of permissible deformation, such as denting of the struck face, can be anticipated. A much less severe test would not cause this, but it would not provide the level of safety assurance desired.

[5] The test is so severe that a degree of permissible deformation, such as the denting of the box end wrenching surfaces 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.

6.2.9.2 Type II Striking Wrench. Three samples of the same style and size wrench shall be mounted and tested using the same apparatus and method used in para. 6.2.9.1, except the drop weight shall be dropped 20 times onto the struck face of the middle wrench. Drop weights and drop heights are listed in Table 6.2.9.1-1. Alternate methods of striking the wrench may be used if the required impact energy in Table 6.2.9.1-1 is satisfied.

6.3 Tensile Force Test

For Category 44 chisels with separate handles, the chisel blade and handle shall not loosen when subjected to a 60-lbf tensile force applied at room temperature.

Assembled Category 52 pry bar handles shall not break, loosen, or separate from the pry bar when subjected to the force specified in Table 6.3-1.

6.4 Side Force Test

This test applies only to Category 44 Types I and II chisels. There shall be no evidence of breaks, cracks, or permanent deformation when a side force as indicated in the following table is applied perpendicular and then parallel to the blade flats at 0.50 in. from the struck face, with the blade rigidly supported 1.5 in. from the cutting edge (see Figure 6.4-1).

Cutting Edge Width, in.	Side Force, lbf
<0.50	10
≥0.50 and <1.00	20
≥1.00 and <1.50	30
≥1.50	50

6.5 Permanent Set

6.5.1 Category 44 Type III Ripping Chisels. Samples shall be supported as shown in Figure 6.5.1-1 and a bending moment of 4,500 lbf-in. applied. After application of the bending moment, the sample shall be removed from the supporting fixture and measured for permanent set. Permanent set is determined by measuring the vertical displacement, relative to the horizontal plane through the centerline of the sample, of a fixed point on the chisel handle (preferably near the struck face end of the chisel) and dividing the displacement by the distance from the fulcrum. Samples pass this test only if all of the following conditions are met after loading the tool:

(a) The sample does not fracture.

(b) The sample does not permanently deform more than 0.1 in./in.

6.5.2 Category 44 Type IV Flooring/Electricians' Chisels. Samples shall be supported as shown in Figure 6.5.1-1 and a bending moment of 2,000 lbf-in. applied. After application of the bending moment, the sample shall be removed from the supporting fixture and measured for permanent set. Permanent set is determined by measuring the vertical displacement, relative to the horizontal plane through the centerline of the sample, of a fixed point on the chisel handle (preferably near the struck face end of the chisel) and dividing the displacement by the distance from the fulcrum. Samples pass this test only if both of the following conditions are met after loading the tool:

(a) The sample does not fracture.

(b) The sample does not permanently deform more than 0.01 in./in.

6.6 Bending Moment Test for Category 48 Type II, Class 4 Drift or Lining-Up Punches

With the punch supported not more than 0.25 in. from the point end, pivoted on a cylindrical fulcrum that is located one-third of the taper length from the point end, a bending moment is applied by a static force at the midpoint of the body with the force acting substantially at right angles to the axis of the body. The diameter of the fulcrum shall be approximately twice that of the punch cross section at the point of contact and oriented at right angles to the axis of the punch. The punch must show at least 20-deg permanent deformation without fracture (see Figure 6.6-1).

6.7 Handle Static Force Test

Handles of assembled Category 48 chisels and punches shall not break, loosen, or otherwise fail when subjected to a force of 150 lbf while

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

(b) the static force is applied vertically at a point on the handle measuring 10 in. from the top of the tool (see Figures 6.7-1 and 6.7-2)

6.8 Nail-Pulling Test — Category 52

6.8.1 Type I. Six common unhardened nails (16d) corresponding to ASTM F1667 designation F1667 NLCMS-11B shall be driven into a softwood board with a minimum thickness of 3.5 in. so that the nailheads are flush with the board surface. Using an appropriate size ball peen, hand drilling, or engineer's hammer (see Table 2-1), the claw end of the nail-puller bar is to be driven into the wood under the nailheads by striking the heel so that the V-shaped opening grips the nail shanks. Each nail is to be completely removed from the wood by successively engaging the nail shank with the V-shaped opening of the claw. There shall be no cracks or bending of the claw or tips and no cracking or chipping of the V-shaped opening.

6.8.2 Type II, Class 1 Multipurpose. Each nail-pulling slot or opening shall completely remove six two-penny common nails driven into softwood board with a minimum thickness of 0.63 in. so that the nailheads are within 0.13 in. of the board surface. Successive prying using shims may be required. The test shall be repeated for every V-shaped opening or slot that is designed to pull nails. The pry bar shall not permanently deform or break.

6.8.3 Type II, Class 2 Wrecking/Ripping. Six common unhardened nails (16d) corresponding to ASTM F1667 designation F1667 NLCMS-11B shall be driven into a softwood board with a minimum thickness of 3.5 in. so that the nailheads are within 0.25 in. of the board surface. The pry bar shall be positioned so that the V-shaped opening engages the nail shank immediately beneath the nailhead. Each nail shall be completely removed from the wood by applying force to the pry bar. Successive prying using shims may be required. The test shall be repeated for every V-shaped opening or slot that is designed to pull nails. The pry bar shall not permanently deform or break.

6.9 Category 52 Type II Prying Test

Each end of the nail-puller bar shall be tested with the load applied as close to the opposite end as practical, as shown in Figure 6.9-1, illustrations (a) and (b). Apply a slow, steady load to the nail-puller bar to meet the torque specified in Table 6.9-1. If the blade or tip fails or takes a permanent set, the nail-puller bar has failed this test.

6.10 Category 52 Type III Prying Tests

6.10.1 Prying End Test. The load shall be applied near the middle of the handle or grip area of the pry bar [see Figure 6.9-1, illustration (c)]. Apply a slow, steady load to the pry bar to the torque specified in Table 6.10.1-1. If the blade or tip fails, takes a permanent set, or if the handle loosens from the pry bar, the pry bar has failed this test.

6.10.2 Point End Test. The load shall be applied near the middle of the grip area of the pry bar (see Figure 6.10.2-1). Apply a slow, steady load to the pry bar to the minimum bend angle specified in Table 6.10.2-1. The pry bar shall not fracture before the minimum bend angle is achieved.

6.11 Category 52 Handle Solvent Resistance Test

Assembled pry bar handles shall be fully immersed in the test fluids specified (new samples 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.

Figure 6.2.2-1 Impact Test for Category 44 Types I and II Chisels

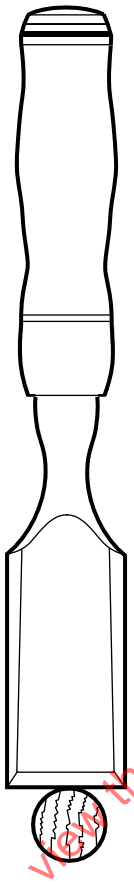


Table 6.2.4-1 Category 46 Impact Test Parameters

Extractor — Corresponding Drill Size, in. [Note (1)]	Drop Weight, lb	Drop Height of Weight, in.
1/16	1.0	1.0
3/32	1.0	2.0
1/8	1.0	5.0
5/16	1.0	10.0
3/16	2.5	10.0
7/32	2.5	20.0
1/4	2.5	30.0
5/16	5.0	25.0
3/8	5.0	35.0
7/16	10.0	22.0
1/2	10.0	27.5
5/8	20.0	19.0
3/4	20.0	24.0

NOTE:
(1) Sizes other than those listed shall be tested to the next smaller drill size.

Table 6.2.5-1 Impact Test Parameters — Category 48 Type I Chisels

Chisel Class	Cutting Edge Width, in.	Drop Weight, lb	Drop Height of Weight, in.	Number of Hits	Test Bar	
					Shape and Material	Hardness
1, 2, and 3	<0.375	10	6	20	0.25-in. diameter rod, AISI 01	33–35 HRC
	0.375 to <0.56	10	20	20	0.25-in. diameter rod, AISI 01	33–35 HRC
	≥0.56	10	30	20	0.25-in. diameter rod, AISI 01	33–35 HRC
4 and 5	All sizes	5	10	10	Rectangular, 0.75-in. minimum thickness and at least 0.25 in. wider than chisel-cutting edge, SAE-AISI 1018–1030	80–85 HRB
1.0	All sizes	10	40	10	Rectangular, 0.75-in. minimum thickness and at least 0.25 in. wider than chisel-cutting edge, SAE-AISI 1018–1030	25–30 HRC

GENERAL NOTE: For further information about AISI designations, contact American Iron and Steel Institute, 2000 Town Center, Southfield, MI 48075 (www.steel.org).

Table 6.2.5-2 Impact Test Parameters — Category 48 Type II Punches

Punch Class	Nominal Point Size, in. [Note (1)]	Drop Weight, lb	Drop Height of Weight, in.	Number of Hits	Test Plate Hardness, HRC
1 and 7 (backing-out)	3/8 to <5/8	20	25	20	45–50
	≥5/8	20	30	20	45–50
2 (bearing race)	7/16 × 15/64	20	15	20	45–50
	1/2 × 17/64	20	20	20	45–50
	9/16 × 19/64	20	25	20	45–50
	5/8 × 9/16	20	30	20	45–50
3 (center)	<3/16	5	10	20	25–30
	≥3/16	5	15	20	25–30
4 (drift or lining-up)	3/32	5	5	20	45–50
	1/8	5	10	20	45–50
	3/16	5	20	20	45–50
	1/4	5	20	20	45–50
	5/16	10	20	20	45–50
	3/8	10	20	20	45–50
5 (pin)	1/16	1	5	20	45–50
	3/32	1	7	20	45–50
	1/8	2.5	10	20	45–50
	5/32	5	10	20	45–50
	3/16	5	20	20	45–50
	7/32	5	30	20	45–50
	1/4	10	25	20	45–50
	5/16	10	30	20	45–50
	3/8	10	30	20	45–50
6 (prick)	All sizes	5	5	20	25–30
8 (starting)	1/16	1	20	20	45–50
	3/32	2.5	10	20	45–50
	1/8	5	10	20	45–50
	3/16	10	15	20	45–50
	7/32	10	20	20	45–50
	1/4	10	35	20	45–50

NOTE: (1) Sizes other than those listed are tested to the next smaller point size.

Table 6.2.5-3 Impact Test Parameters — Category 48 Type III Drift Pins

Body Size, in.	Drop Weight, lb	Drop Height of Weight, in.	Number of Hits	Test Plate Hardness, HRC
9/16	5	25	20	25–30
11/16	10	20	20	25–30
13/16	10	25	20	45–50
15/16	20	25	20	45–50
1 1/16	20	30	20	45–50

Table 6.2.8-1 Category 52 Handle Impact Test Specifications

Nominal Across Flats of Shank, in.	Drop Weight, lb ±2 oz	Drop Height, in. ±0.5	Maximum Shank Penetration Into Handle, in.
≤1/4	15	10	0.7
>1/4 but ≤3/8	15	20	0.7
>3/8 but ≤7/16	15	25	0.7
>7/16	15	35	0.7

Figure 6.2.8-1 Category 52 Handle Impact Test

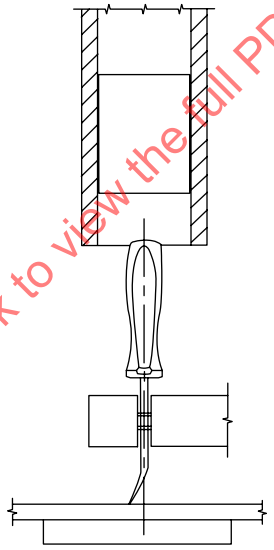


Table 6.2.9.1-1 Category 59 Impact Test Specifications

Wrench Style	Nominal Wrench Opening, in.	Drop Weight, lb	Drop Height, ft	Impact Energy, ft-lbf
Slugging (offset and straight shank), Types I and II	<2	10	10	100
	≥2 but <2 3/4	15	10	150
	≥2 3/4	24	15	360
Striking, Type III	<1 5/8	5	5	25
	≥1 5/8 but <2 3/8	10	5	50
	≥2 3/8	10	10	100

Figure 6.2.9.1-1 Impact Test Setup