ASME B107.51-2001

STAR DRILLS: SAFETY REQUIREMENTS

AN AMERICAN NATIONAL STANDARD

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

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

FOREWORD

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

The scope of this Standard is limited to the essential safety considerations specifically applicable to star drills.

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

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

This Standard, formerly ANSI/HTI B209.8, was approved as an American National Standard on January 3, 2001.

ASME STANDARDS COMMITTEE B107
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, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B107 Standards Committee
The American Society of Mechanical Engineers
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Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

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

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

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

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

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

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

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

CONTENTS

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STAR DRILLS: SAFETY REQUIREMENTS

1 GENERAL

1.1 Scope

This Standard provides safety requirements for the design, construction, testing, and use of hand-held star drills. These hand-held star drills are intended for use in drilling holes in brick, tile, concrete, or stone.

1.2 Purpose

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

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

1.3 Application

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

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

1.4 Shall and Should

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

1.5 Equivalent

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

2 NORMATIVE REFERENCES

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

ANSI Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection, (includes supplement and partial revision ANSI Z87.1A-1991)

ANSI Z535.4-1991, Product Safety Signs and Labels

Publisher: American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036

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

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

ASTM A 331-90, Standard Specification for Steel Bars, Alloy, Cold-Finished

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

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

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

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

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

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

3 GLOSSARY

See Fig. 1 as applicable.

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

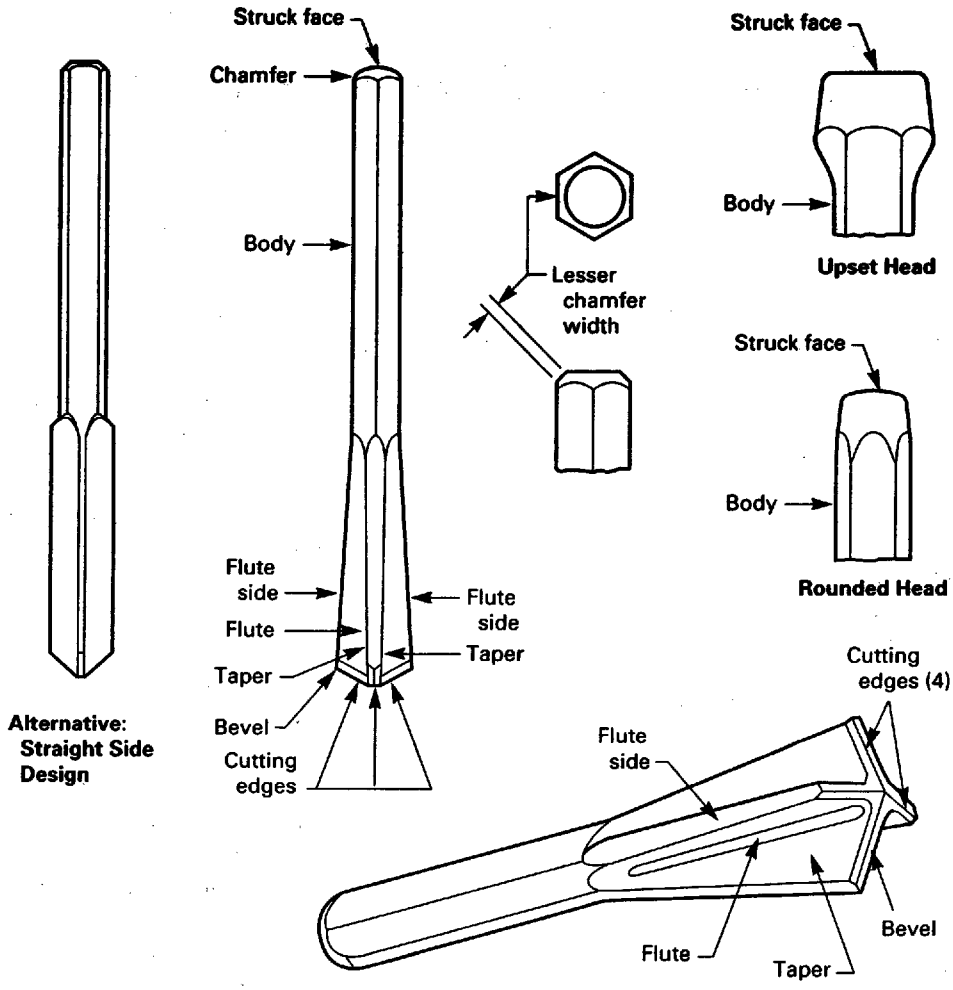

FIG. 1 NOMENCLATURE FOR STAR DRILL

body: the straight portion of the star drill between the chamfer on one end and the taper, flute, and the flute side on the other end.

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

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

flute: the rounded groove of the star drill between any two adjacent tapers extending to the body and bevels.

flute side: the portion of the star drill adjacent to the taper and extending from the body to the bevels.

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

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

struck face: the portion of the star drill, exclusive of the chamfer and body, directly opposite the cutting edges.

taper: the portion of the star drill between the flute and the flute side extending from the body to the bevels with gradually reducing cross-sectional area.

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

4 GENERAL REQUIREMENTS

4.1 Design

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 a ball peen, hand drilling, or engineer's hammer of the appropriate type and size. The appropriate size hammer shall have a striking face not less than 0.375 in. (9.53 mm) larger than the diameter of the struck face of the star drill. Star drills may be relieved from the cutting edges to permit ejection of dust and debris from the hole being drilled.

4.1.1 The struck face of the star drill shall have a convex shape or a flat surface.

4.1.2 The struck face shall have a chamfer of approximately 45 deg or equivalent radius all around the perimeter with the lesser width (Fig. 1) equal to approximately one-tenth the body stock size. For example, if the body stock size equals 1.00 in. (25.4 mm), the lesser chamfer width (Fig. 1) should equal approximately 0.100 in. (2.54 mm).

4.1.3 All star drills shall be free of nonfunctional sharp edges, points, and surface roughness that could inflict personal injury to the user.

4.2 Materials

4.2.1 Star drills shall be made from special-quality, fine grain, hot-rolled or cold-rolled 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 A 29/A 29M, ASTM A 322, ASTM A 331, ASTM A 576, or ASTM A 681.

4.2.2 Star drills shall be free from such manufacturing and material defects as seams, laps, pipes, cracks, and cold shuts that would jeopardize sound construction. They shall conform to the requirements for mechanical properties specified in para. 4.3 and shall withstand the striking test specified in para. 4.4.3.

4.3 Mechanical Properties

4.3.1 Star drill bevels and tapers shall be hardened and tempered to a hardness of not less than 53HRC nor more than 60HRC for a distance of not less than 0.625 in. (15.88 mm) from the cutting edges.

4.3.2 The hardness of the struck face of the star drill shall not exceed 45HRC.

4.4 Tests

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

4.4.1 General. Star drills shall be tested and shall conform to the requirements of the tests specified in paras. 4.4.2 and 4.4.3. Separate (new) samples shall be used for each of the tests. Failure to meet the requirements of either of the tests indicates the star drills are not in compliance with this Standard.

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

4.4.3 Impact Test. There shall be no chipping, spalling, or cracking of the cutting edge or struck face and no bending of the star drill when tested according to the following procedure. Normal deformation at either end is permitted.[1]

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 [see para. 5(c)] until a hole of not less than 0.50 in. (12.7 mm) in depth has been attained. The star drill should be rotated slightly after each successive hit. Three holes shall be drilled.

5 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

(a) Star drills are special-purpose tools designed and intended only for the drilling of holes in brick, tile, concrete, and stone.

(b) A hammer blow should always be struck squarely with the hammer face parallel with the struck face of the star drill. Glancing blows, overstrikes, and understrikes should be avoided.

[1] The impact 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 prevent this, but it would not provide the level of safety assurance desired.

(c) No surface of the star drill other than the struck face shall be struck. A hand drilling, ball peen, or engineer's hammer of the appropriate type and size shall have a striking face with a diameter not less than 0.375 in. (9.53 mm) larger than the struck face of the star drill.

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

(e) Star drills shall be inspected prior to each use, and their use shall be discontinued at the first sign of bending of the star drill, or of chipping or cracking of the cutting edge or the struck face.

(f) Except as indicated in paras. 5(g) and 5(h), no area, section, or portion of the star drill shall be ground, welded, treated by reheating, or otherwise altered from the original condition as furnished by the manufacturer.

(g) As dulling of the cutting edge occurs from tool usage, the cutting edge shall be resharpened or redressed to its original contour by the use of a whetstone or hand file.[2]

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

(h) Any mushrooming of the struck face of the star drill shall be redressed to its original contour by the use of the hand file.[2]

(i) Instructors and/or employers shall stress proper use and safety in the use of star drills and shall emphasize the necessity to wear and ensure the use of safety goggles. The publication, *Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care*, provides guidelines for the safe use of these tools.

(j) Each star drill shall be stamped, labeled, or otherwise marked by the manufacturer with the following safety message or equivalent.

WARNING
WEAR SAFETY GOGGLES
USER AND BYSTANDER

Pictorials are an acceptable equivalent. When size does not permit the complete safety message, *USER AND BYSTANDER* may be omitted from the above safety message.

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

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

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AMERICAN NATIONAL STANDARDS FOR HAND TOOLS

Socket Wrenches, Hand (Inch Series) B107.1-1993
Socket Wrenches, Extensions, Adaptors, and Universal Joints, Power Drive (Impact) (Inch Series) B107.2-1995
Socket Wrenches, Power Drive (Non-Impact) (Inch Series) ..... B107.3-1978(R1991)
Driving and Spindle Ends for Portable Hand, Impact, Air, and Electric Tools (Percussion Tools Excluded) B107.4M-1995
Socket Wrenches, Hand (Metric Series) B107.5M-1994
Wrenches, Box, Angled, Open End, Combination, Flare Nut, and Tappet (Inch Series) B107.6-1994
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Electronic Tester, Hand Torque Tools B107.29M-1997
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Star Drills: Safety Requirements B107.51-2001
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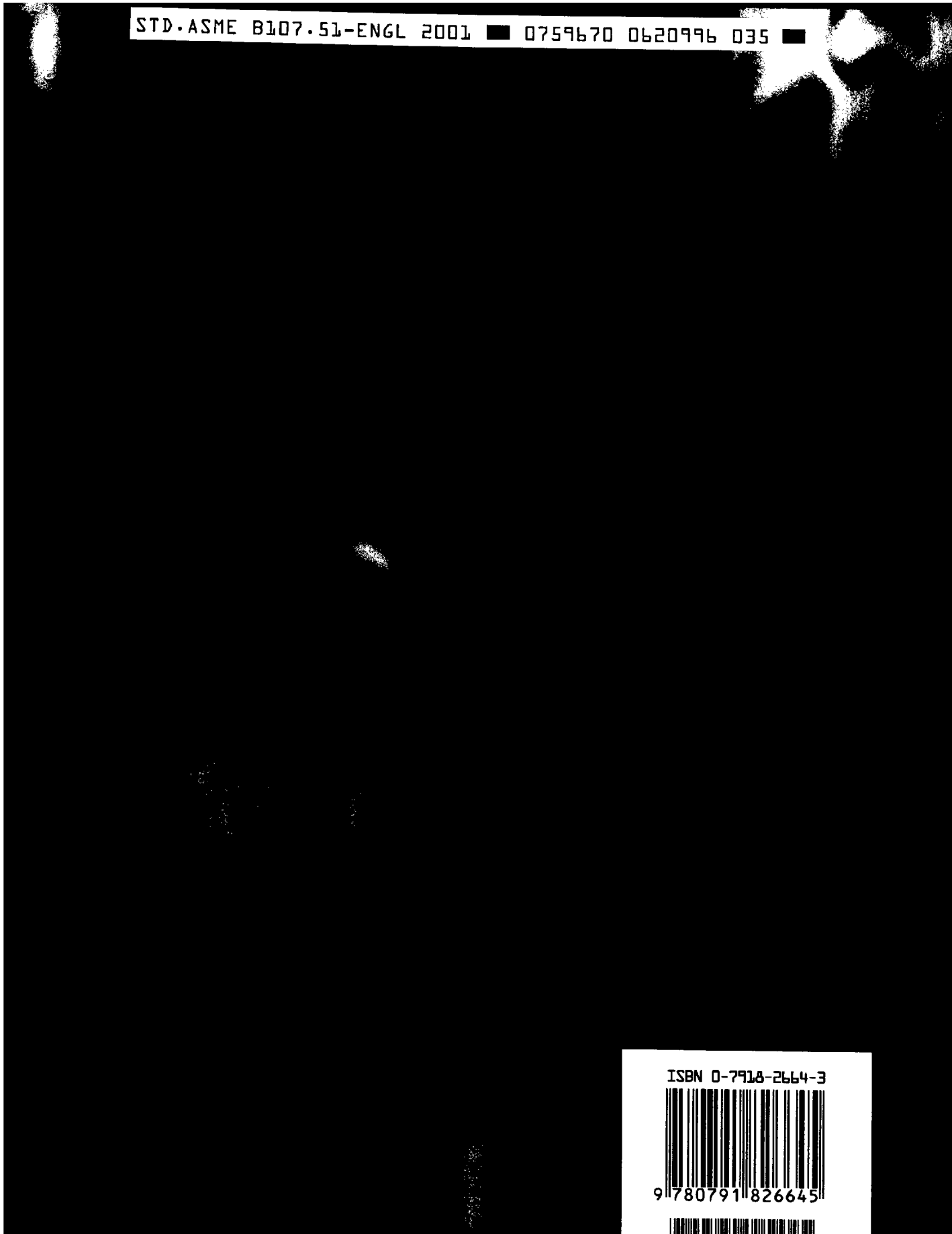
Ball Peen Hammers: Safety Requirements B107.53M-1998
Axes: Safety Requirements B107.55M-1998



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