ASME B107.18-2003
(Revision of ASME B107.18M-1996)

PLIERS: WIRE TWISTER

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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

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FOREWORD

The American National Standards Committee B107, Socket Wrenches and Drives, under sponsorship of The American Society of Mechanical Engineers, was reorganized as an ASME Standards Committee and its title was changed to Hand Tools and Accessories. In 1996 its scope was expanded to address safety considerations.

The purposes of this Standard are to define general and dimensional data and safety considerations specifically applicable to wire twisting pliers and to specify test methods to evaluate performance relating to the defined requirements.

This Standard is a revision of ASME B107.18M-1996 Pliers (Wire Twister). Principal changes in this edition of the Standard are consolidation of Types and Classes and updated references.

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

Suggestions for the improvement of this Standard are welcome. They should be addressed to the Secretary, ASME B107 Committee, Three Park Avenue, New York, NY 10016-5990.

The requirements of this Standard become effective at the time of publication.

This revision was approved as an American National Standard on May 1, 2003.

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Hand Tools and Accessories

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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 will be rewritten in this format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

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PLIERS: WIRE TWISTER

1 SCOPE

This Standard is intended to cover the general dimensional and functional characteristics for wire twister pliers, which are used primarily for twisting safety wires (lock wire) on critical equipment on aircraft, automotive equipment, and for other similar applications.

Inclusion of dimensional data in this Standard is not intended to imply that all products described herein are stock production sizes. Consumers are requested to consult with manufacturers concerning lists of stock production sizes.

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.

2 CLASSIFICATION

Type I: Right-hand twist

Class 1: With automatic (spring-loaded) twist rod return mechanism

Style A: Serrated wire clamping jaw surface

Style B: Smooth wire clamping jaw surfaces (no serrations)

Class 2: With hand push twist rod return

Style A: Serrated wire clamping jaw surface

Style B: Smooth wire clamping jaw surfaces (no serrations)

Type II: Left-hand twist

Class 1: With automatic (spring-loaded) twist rod return mechanism

Style A: Serrated wire clamping jaw surface

Style B: Smooth wire clamping jaw surfaces (no serrations)

Class 2: With hand push twist rod return

Style A: Serrated wire clamping jaw surface

Style B: Smooth wire clamping jaw surfaces (no serrations)

Type III: Reversible

Class 1: With automatic (spring-loaded) twist rod return mechanism

Style A: Serrated wire clamping jaw surface

Style B: Smooth wire clamping jaw surfaces (no serrations)

Class 2: With hand push twist rod return

Style A: Serrated wire clamping jaw surface

Style B: Smooth wire clamping jaw surfaces (no serrations)

3 NORMATIVE REFERENCES

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

ASME B107.25M-1996 Pliers — Performance Test Methods

Publisher: The American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300

ASTM A313-98 Standard Specification for Stainless Steel Spring Wire

Publisher: The American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959

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

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

4 DEFINITIONS

Definitions of terms used within this Standard may be found in ASME B107.25M.

5 REQUIREMENTS

The illustrations shown herein are descriptive and nonrestrictive, and are not intended to preclude the manufacture of wire twisters that are otherwise in accordance with this Standard.

5.1 Design

Wire twister pliers shall conform to Table 1 or 1M for the size specified, shall be similar to those shown in Fig. 5, and shall meet the dimensional requirements of Fig. 1, 2, 3, or 4. They shall be capable of passing all tests outlined in para. 6.

Table 1 Dimensions of Pliers, Wire Twister, With Side Cutter (See Fig. 5)

Nominal Size	A	B	C
6	6.75 ± 0.50	1.38 ± 0.25	8.50 ± 0.50
9	8.88 ± 0.50	1.50 ± 0.25	10.25 ± 0.25
12	10.18 ± 0.50	1.75 ± 0.25	11.38 ± 0.50

General Note: Dimensions are in inches.

Table 1M Dimensions of Pliers, Wire Twister, With Side Cutter (See Fig. 5)

Nominal Size	A	B	C
152	171 ± 13	35 ± 6	216 ± 13
229	225 ± 13	38 ± 6	260 ± 6
305	259 ± 13	44 ± 6	289 ± 13

General Note: Dimensions are in millimeters.

Wire twister pliers shall incorporate a device, which, when actuated, will cause the pliers to rotate about its longitudinal axis. The halves of the pliers shall be permanently joined with a through fastener that shall act as the pivot or fulcrum point of the pliers. A locking device, when engaged, shall hold the handles in a closed position in such a manner as to cause the jaws to firmly and securely grip and hold strands of lock wire.

A wire clearance opening shall be provided between the two jaws and located between the gripping and cutting areas of the jaws. This opening shall be of a size and design which will permit the user to swiftly and easily deflect double strands of wire out of the sides of the jaws and away from the cutting edges when performing continuous (multiple) lock wiring operations. The nose design shall be as shown in Figs. 1 through 4 and blend with the radius of the sides of the pliers in accordance with good commercial practice. The maximum permissible opening at the top of the jaws, when closed, shall be as shown in Figs. 1 and 2.

5.2 Material

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

5.3 Finish

Surfaces shall have a rust preventive treatment and be essentially free from pits, nodules, burrs, cracks, and other conditions that would adversely affect the performance or safety of the tool. When provided, coatings shall be adherent, smooth, continuous, and free from any conditions that would interfere with their protective value, safety, and function.

5.4 Marking

Pliers shall be marked in a plain and permanent manner with the manufacturer's name or with a trademark of such known character that the source of manufacture and country of origin shall be readily determined. Marking shall be as permanent as the normal life expectancy of the pliers to which it is applied (providing the marked surface has not been subjected to a fretting or abrading action) and be capable of withstanding the cleaning procedures normally experienced during its intended use.

5.5 Handles

Handles shall have a hardness of 36 HRC to 50 HRC, shall be shaped to provide a comfortable handgrip, and shall be free from rough edges and sharp corners.

5.6 Jaws

5.6.1 Hardness. Jaws shall have a hardness of 36 HRC to 50 HRC. The gripping portion of the jaws and wire cutter shall be heat treated to a hardness of 56 HRC to 64 HRC. Jaw surfaces and edges shall not damage the wire being twisted.

5.6.2 Cushion Grip Throat. Cushion grip throat, when provided, shall grip and retain cut wire end. The cushion grip throat shall be nonmetallic and capable of withstanding normal use without deteriorating or rubbing off and shall pass the solvent resistance test in para. 6.4. Cushion grip throat shall remain permanently attached under normal use.

5.7 Joint Fastener

The fastener shall have a hardness of 25 HRC to 50 HRC.

5.8 Spiral Mechanism

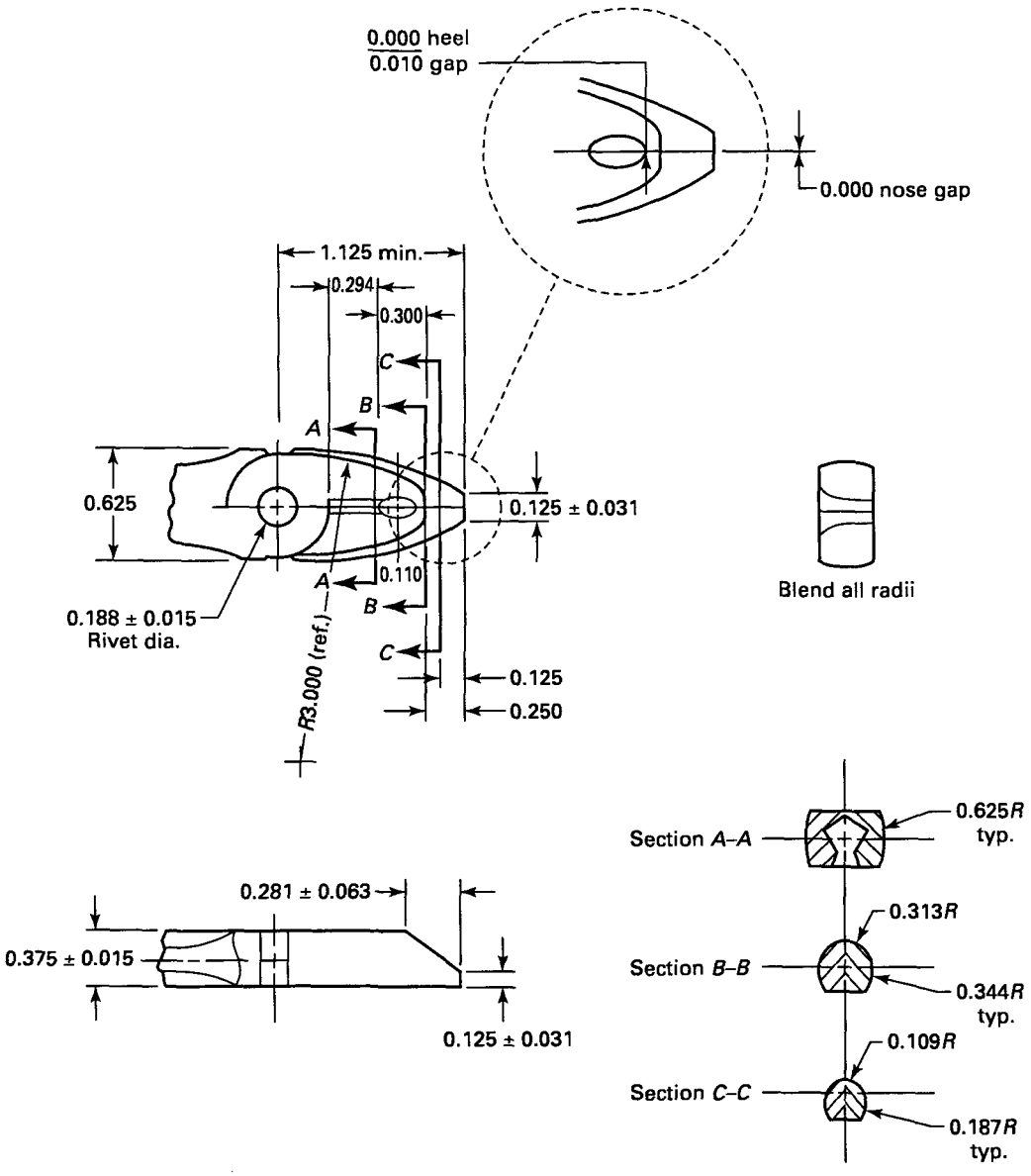
The spiral mechanism shall be capable of producing a close, uniform twist in safety wire without binding of or damage to the mechanism. This mechanism shall be mounted between the handles of the pliers and shall be permanently affixed to one handle in such a position that the longitudinal axis of the mechanism shall correspond to the longitudinal axis of the pliers. The mechanism, when actuated, shall cause pliers to rotate about its longitudinal axis in its intended direction(s). Each full actuation of the mechanism shall cause the pliers to make the following minimum number of complete rotations:

(a) for 6 in. (152 mm) size, 2½ rotations (with automatic return, 2 rotations)

(b) for 9 in. (229 mm) size, 3 rotations (with automatic return, 2½ rotations)

(c) for 12 in. (305 mm) size, 4 rotations (with automatic return, 3½ rotations) (Type III Reversible, 3 rotations)

The design of the mechanism shall permit a comfortable, adequate grip by the operator.



GENERAL NOTE: Gap of nose must not exceed gap at heel of serration. Gap should be uniform in nature around serrated jaw edges. Measurements to be taken with jaws in closed position.

Fig. 1 Nose Design, Pliers, Wire Twister, 6 in.

5.9 Locking Device

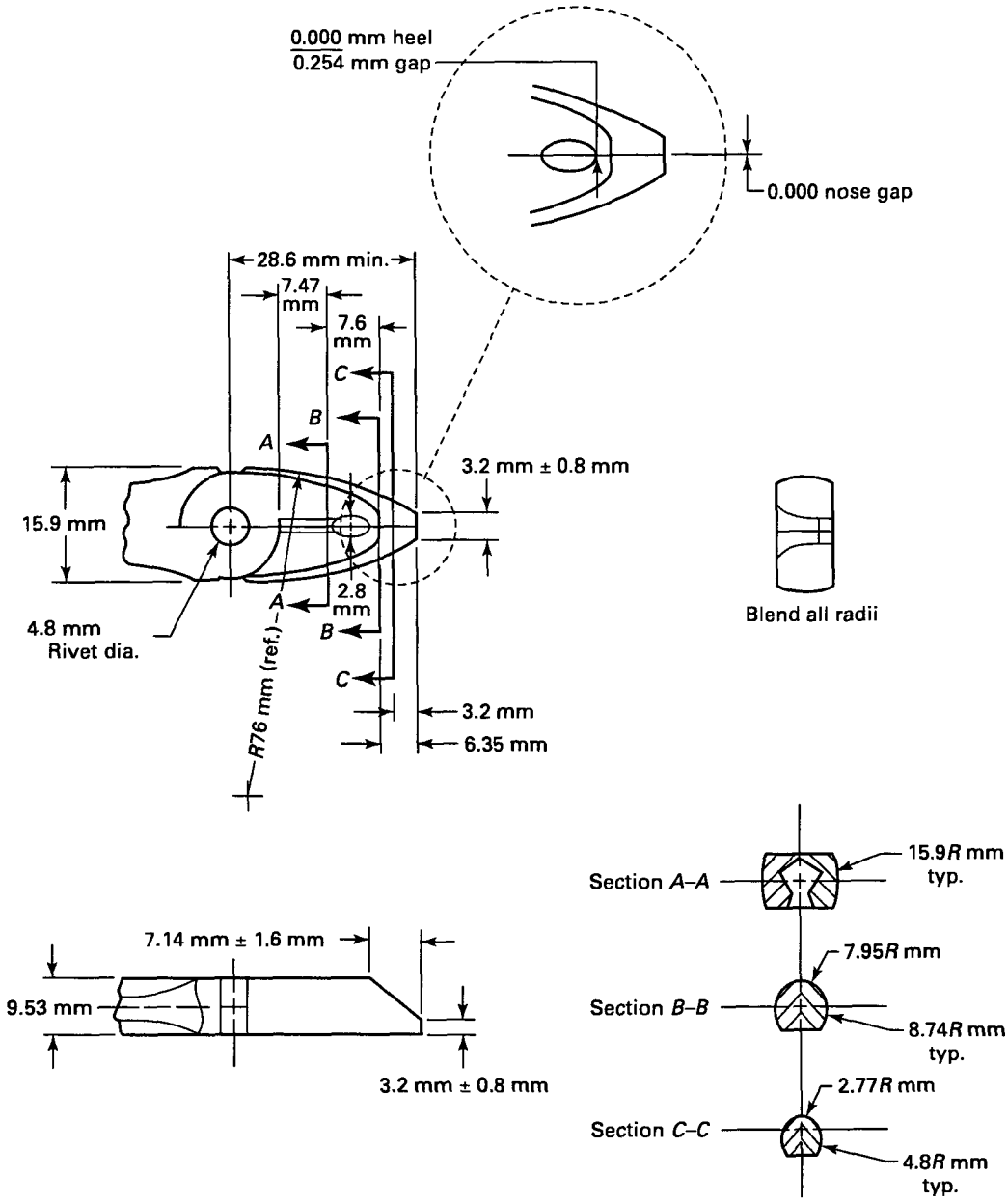
The locking device shall be so designed that when the pliers' jaws are closed, the handles must be further compressed in order to engage the lock. Release of the locking device shall be accomplished automatically when the handles are compressed. The locking device shall not interfere with the user's hands when performing lock wiring operations.

6 TESTS

SAFETY WARNING: Many tests required herein are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting these tests.

6.1 Test Equipment

The equipment required for performing the wire twisting tests shall consist of a coupler securely attached to a 35 lb (16 kg) ± 0.5 lb (0.2 kg) weight so that a 0.051



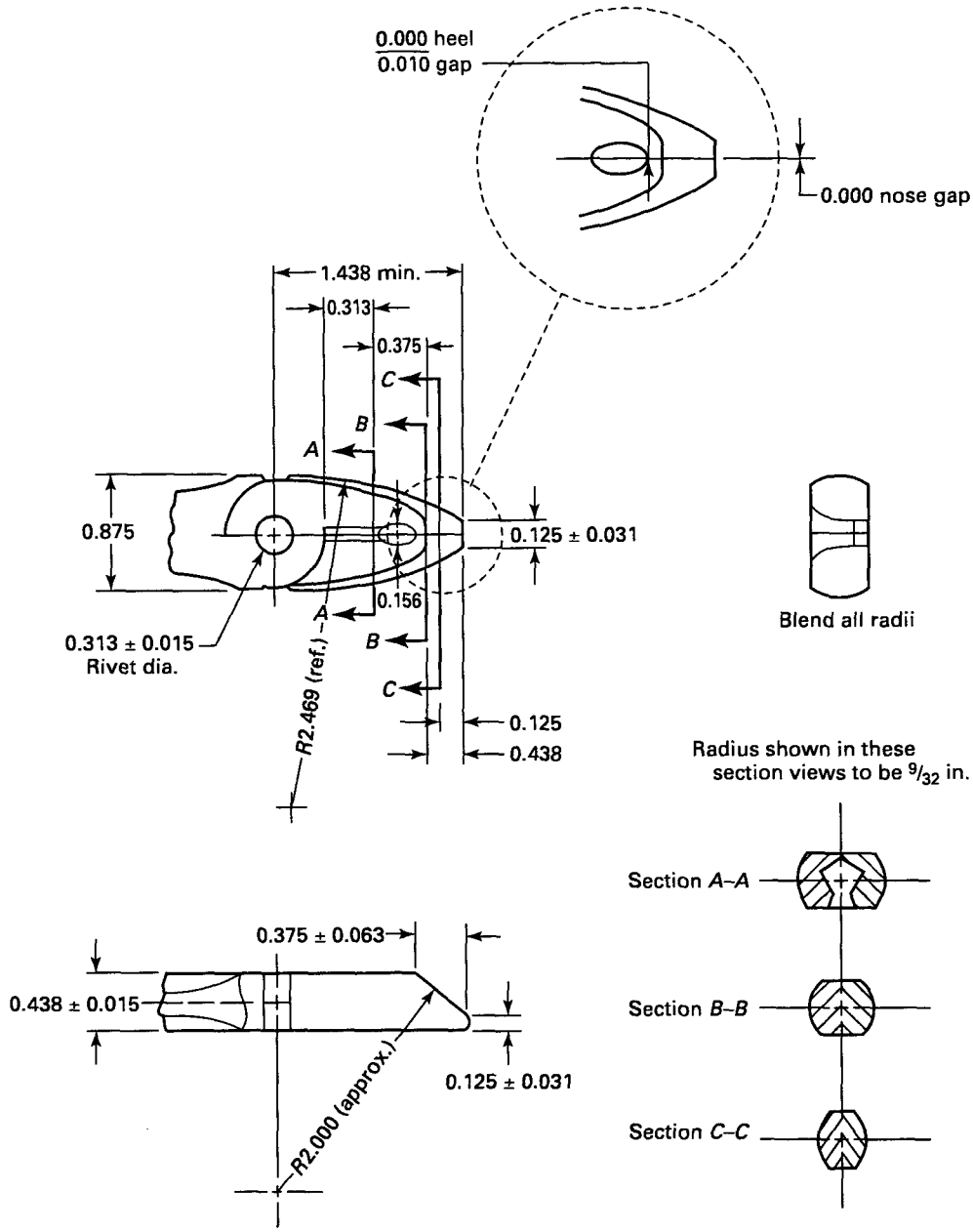
GENERAL NOTE: Gap of nose must not exceed gap at heel of serration. Gap should be uniform in nature around serrated jaw edges. Measurements to be taken with jaws in closed position.

Fig. 2 Nose Design, Pliers, Wire Twister, 152 mm

in. (1.30 mm) diameter stainless steel test wire may be looped through the coupler. The weight shall not rotate on its vertical axis during the wire twisting test.

6.2 Jaw Integrity Test

The wire shall be attached to the weight by passing one end through the coupler, and then gripping both free ends of the wire with the jaws of the pliers. The ends of the wire shall be inserted side-by-side between the pliers jaws to a depth of approximately 0.5 in. (13 mm), and shall provide from 7.5 in. (191 mm) to 7.88 in. (200 mm) of free wire extending beyond the coupler for twisting. The jaws shall be locked in the gripping position. The wire shall then be twisted by actuating the spiral mechanism a sufficient number of times to produce a minimum of ten uniform tight twists of 360



GENERAL NOTE: Gap of nose must not exceed gap at heel of serration. Gap should be uniform in nature around serrated jaw edges. Measurements to be taken with jaws in closed position.

Fig. 3 Nose Deisgn, Pliers, Wire Twister, 9 in. and 12 in.

deg each in the wire. Without releasing the grip on the wire, the pliers shall then be made to lift the weight by means of the twisted wire and shall hold the suspended weight for a minimum of 15 sec.

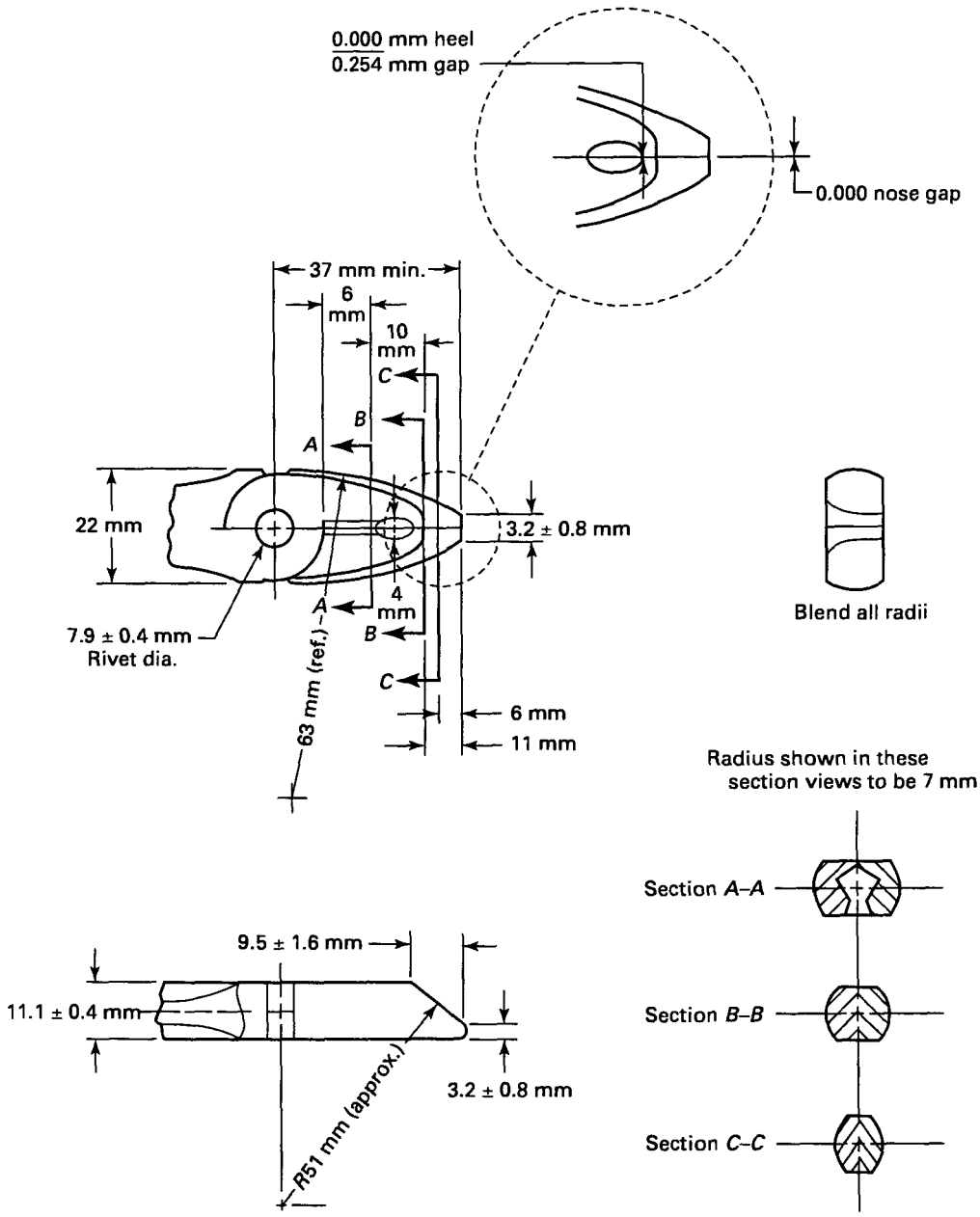
6.3 Cut Tests

6.3.1 Wire Cut Test. Pliers shall cut, at the joint end of the cutting edge, the wire sizes (using the load limits) shown in Table 2 or 2M. Wire shall conform to ASTM A 313. Three cuts of double twisted wire (one cut per size) and three cuts of single strand wire (0.020) shall be made. After completing the cuts, pliers shall lift a weight of 35 lb (16 kg) suspended on a 0.020 wire.

6.3.2 Paper Cut Test. Test per ASME B107.25M.

6.4 Solvent Resistance Test

Nonmetallic components shall be tested per para. 5.5.1 of ASME B107.25M.



GENERAL NOTE: Gap of nose must not exceed gap at heel of serration. Gap should be uniform in nature around serrated jaw edges. Measurements to be taken with jaws in closed position.

Fig. 4 Nose Design, Pliers, Wire Twister, 229 mm and 305 mm

6.5 Hardness Test

Hardnesses specified herein shall be tested per ASME B107.25M. (See para. 5.3.)

6.6 Joint Integrity Test

Pliers shall be tested per para. 5.4.1 of ASME B107.25M using a minimum of 1.50 lbf (6.7 N). Maximum allowable play shall be 0.01 in. per in. (0.025 mm per 25.4 mm).

6.7 Pull Knob Security Test

With the spiral rod in the retracted position, a 100 lbf (448 N) load shall be attached to the pull knob. A force shall then be applied to the pliers, which will simultaneously extend the spiral rod and lift the 100 lbf (448 N) load for one minute. After completion of the test, the

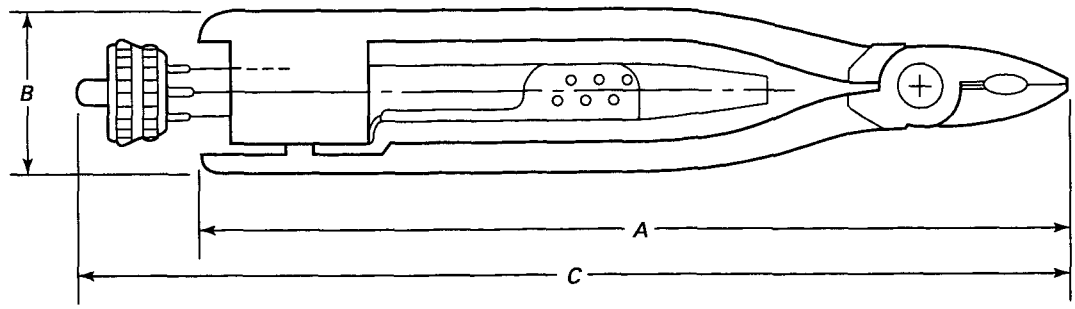


Fig. 5 Pliers Wire Twister, With Side Cutter in Locked Position

knob shall have remained in place with no visible deformation. In addition, the spiral rod shall function as it did prior to the test.

7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

Instructors and employers shall stress proper use and safety in the use of pliers, information about which can be found in the HTI publication, *Guide to Hand Tools — Selection Safety Tips, Proper Use and Care.*

8 DESIGNATIONS

Pliers shall be designated by the following data in the sequence shown:

(*a*) type
(*b*) class
(*c*) style
(*d*) nominal size
(*e*) return mechanism

Table 2 Wire Cut Test Parameters

Nominal Size	Double Cut Wire Sizes, in.	Load Application Distance From Handle End, in.	Maximum Load to Cut Wire, lbf
6	0.041, 0.032, 0.020	1	48
9	0.051, 0.041, 0.020	2	55
12	0.051, 0.041, 0.020	2	47

General Note: Dimensions are in inches.

Table 2M Wire Cut Test Parameters

Nominal Size	Double Cut Wire Sizes, mm	Load Application Distance from Handle End, mm	Maximum Load to Cut Wire, *N*
152	1.04, 0.81, 0.51	25	213
229	1.30, 1.04, 0.51	51	244
305	1.30, 1.04, 0.51	51	209

General Note: Dimensions are in millimeters.

AMERICAN NATIONAL STANDARDS FOR HAND TOOLS

Socket Wrenches, Hand (Inch Series) B107.1-2002
Socket Wrenches, Extensions, Adaptors, and Universal Joints, Power Drive (Impact) (Inch Series) B107.2-2002
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-2002
Adjustable Wrenches B107.8-2003
Handles and Attachments for Hand Socket Wrenches — Inch and Metric Series B107.10M-1996
Pliers: Diagonal Cutting and End Cutting B107.11-2002
Nut Drivers (Spin Type, Screwdriver Grip) (Inch Series) B107.12-1997
Pliers: Long Nose, Long Reach B107.13-2003
Hand Torque Tools B107.14M-1994
Flat Tip Screwdrivers B107.15-2002
Shears (Metal Cutting, Hand) B107.16M-1998
Gages, Wrench Openings, Reference B107.17M-1997
Pliers: Wire Twister B107.18-2003
Pliers, Retaining Ring ..... B107.19-1993(R1998)
Pliers (Lineman's, Iron Worker's, Gas, Glass, Fence, and Battery) B107.20M-1998
Wrench, Crowfoot Attachments B107.21-1998
Electronic Cutters B107.22M-1998
Pliers, Multiple Position, Adjustable B107.23M-1997
Locking Pliers B107.24-2002
Pliers: Performance Test Methods B107.25-2002
Pliers: Multiple Position, Electrical Connector B107.27-2003
Electronic Torque Instruments B107.28M-1997
Electronic Tester, Hand Torque Tools B107.29M-1998
Cross Tip Screwdrivers B107.30-2002
Screwdrivers, Cross Tip Gaging B107.31M-1997
Socket Wrenches, Impact (Metric Series) B107.33M-2002
Socket Wrenches for Spark Plugs B107.34-2003
Nut Drivers (Spin Type, Screwdriver Grip) (Metric Series) B107.35M-1997
Pliers: Locking, Clamp, and Tubing Pinch-Off B107.36-2002
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Ball Peen Hammers: Safety Requirements B107.53M-1998
Heavy Striking Tools: Safety Requirements B107.54-2001
Axes: Safety Requirements B107.55M-2002
Body Repair Hammers and Dolly Blocks:Safety Requirements B107.56-1999
Bricklayers' Hammers and Prospecting Picks: Safety Requirements B107.57-2001
Riveting, Scaling, and Tinner's Setting Hammers: Safety Requirements B107.58M-1998
Slugging and Striking Wrenches B107.59-2002
Wrenches B107.100-2002

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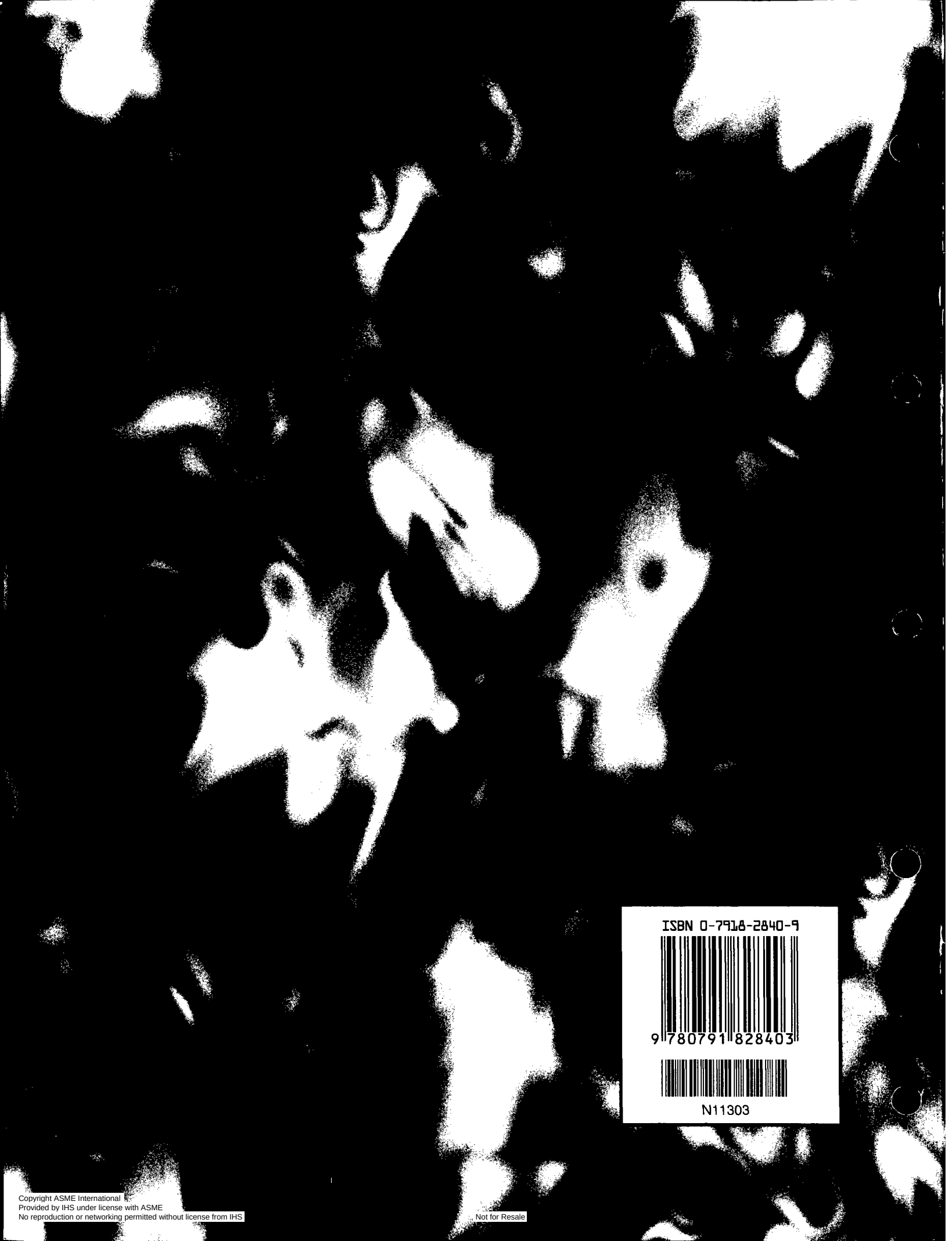

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